MINING WORLD

WHAT'S AHEAD IN METALLURGY

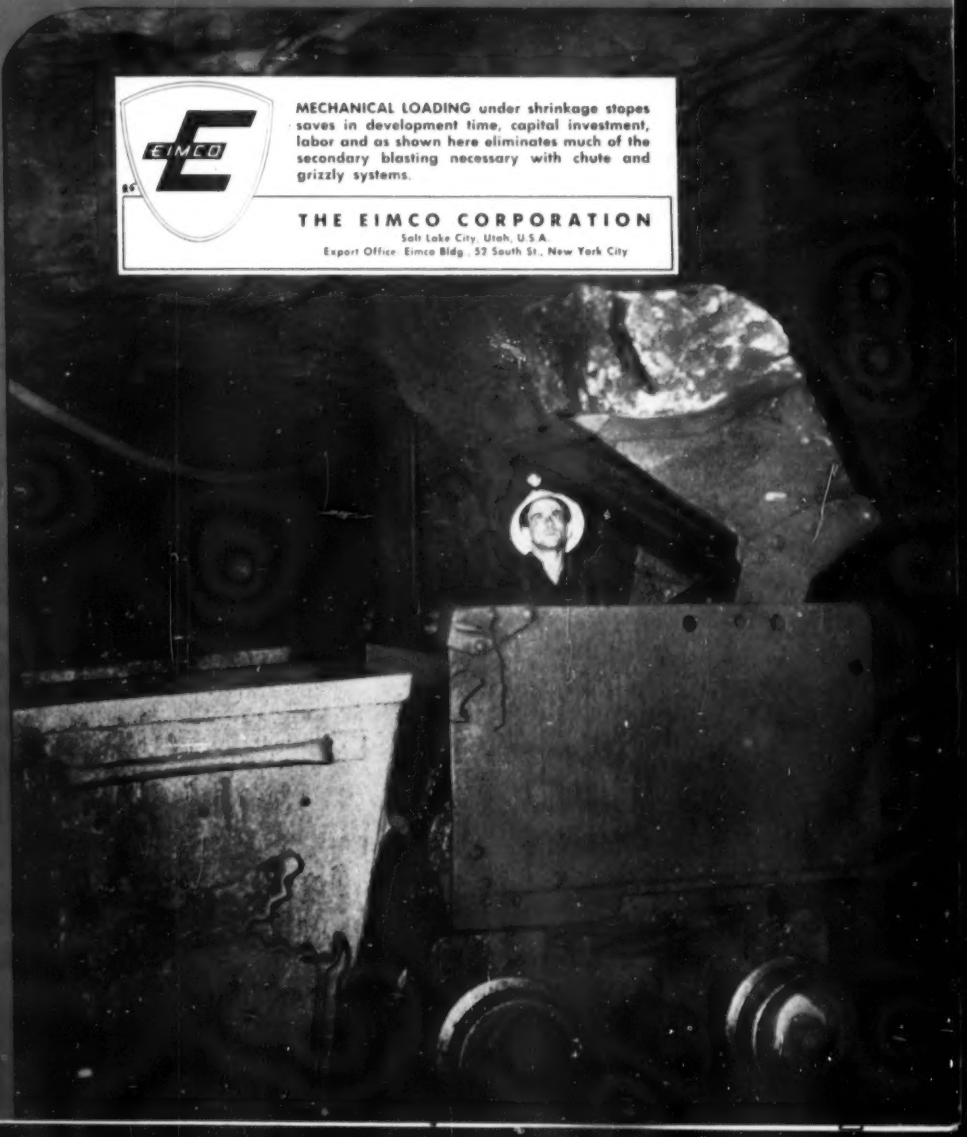
in this issue

Cyclones as Classifiers: Page 44
Uruwira's New Mill: Page 48

EIMCO

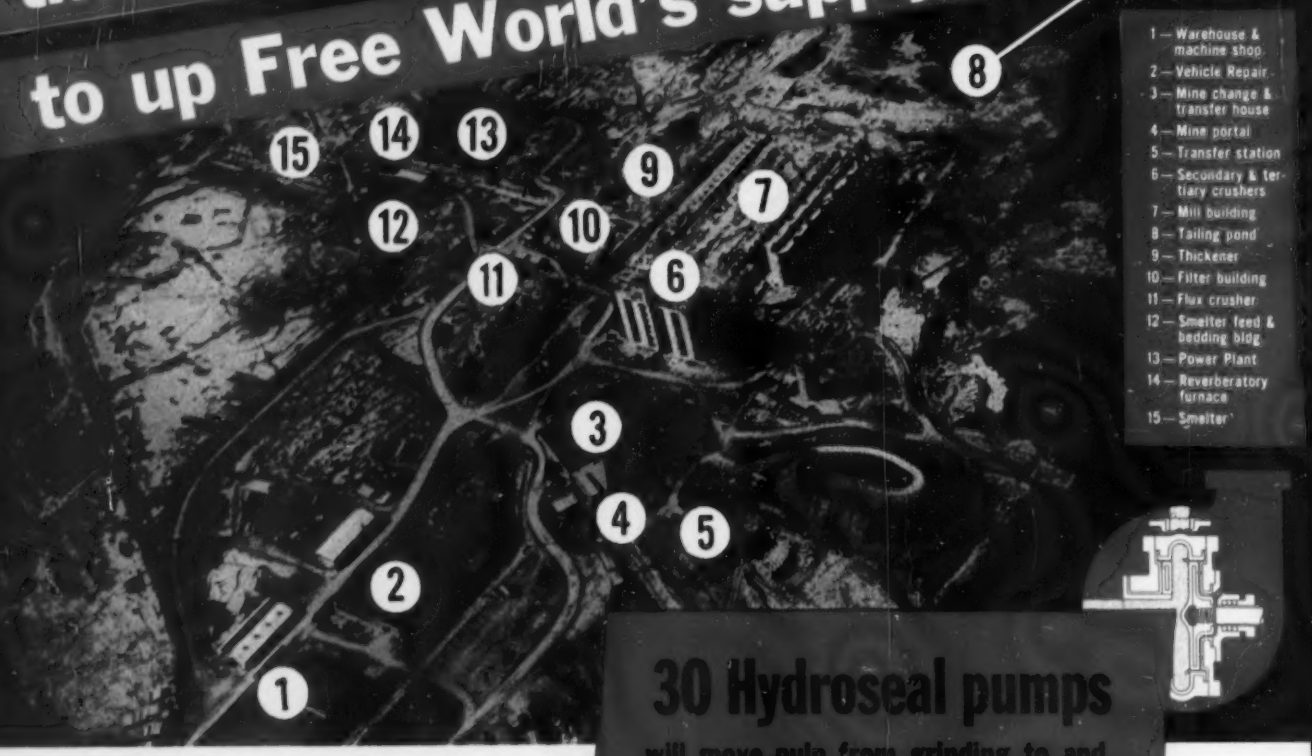
MECHANICAL LOADING under shrinkage stopes saves in development time, capital investment, labor and as shown here eliminates much of the secondary blasting necessary with chute and grizzly systems.

THE EIMCO CORPORATION
Salt Lake City, Utah, U.S.A.
Export Office: Eimco Bldg., 52 South St., New York City



JANUARY, 1934
Vol. 16 No. 1
35 cents a copy
in sterling 2s

White Pine Copper will use the modern proven techniques to up Free World's supply


1 — Warehouse & machine shop
2 — Vehicle Repair
3 — Mine change & transfer house
4 — Mine portal
5 — Transfer station
6 — Secondary & tertiary crushers
7 — Mill building
8 — Tailing pond
9 — Thickener
10 — Filter building
11 — Flux crusher
12 — Smelter feed & bedding bldg.
13 — Power Plant
14 — Reverberatory furnace
15 — Smelter

Air view of White Pine Copper Company's plant under construction southwest of Ontonagon, Michigan port on Lake Superior. Utilizing every modern facility, this largest post-war copper project is designed to mine 12,500 tons of ore daily on a 6-day schedule, to grind 10,500 tons daily on a 7-day cycle, and to add annually 75-million pounds of copper (99.9% purity) to U. S. production.

White Pine engineers insist that pumping be continuously efficient and economical. Their selection of Hydroseals is a good reason for referring *your* pumping problem to us.

30 Hydroseal pumps

will move pulp from grinding to and through wet-way extraction processes

Six of the 30 Hydroseal Slurry Pumps will handle the overflow from 12 classifiers. Another six will feed Primary Deslimming cyclones. Four Hydroseals will serve for concentrate gathering. Six Hydroseals will distribute to regrind cyclones. Four Hydroseals will handle sand tailing, while four other Hydroseals will move slime tailing through separate discharge lines.

Write today for new Hydroseal catalog.

THE ALLEN-SHERMAN-HOFF PUMP CO.

Dept. J —259 E. Lancaster Ave., Wynnewood, Pa.

Representatives throughout the World

HYDROSEAL and CENTRISEAL

SAND, SLURRY & DREDGE PUMPS

MAXIMIX RUBBER PROTECTED

ROCK RATED!

for the hardest years ahead

Your profits depend on the strength and speed of loading equipment — and P&H gives you more of *both*.

P&H *greater strength* comes from welded alloy steels — the toughest construction known. No wonder P&H can take pounding and shock loads that K.O. less rugged machines.

P&H *greater speed* comes from Magnetorque* Electric Swing — actually 15% to 25% faster than any other machine of its size to give you greater production, lower tonnage costs. And it's goodbye to maintenance and replacement problems for years to come . . . Magnetorque lasts the life of your P&H.

But to get fully acquainted with this outstanding producer, let us direct you to a 955-A in action. If you want bigger capacity, same advanced design, ask about the P&H 1055-A (3½ yd.)

P&H MAGNETORQUE* Electric Swing puts you beyond the "clutches of wear"

*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

P&H LARGE EXCAVATOR DIVISION
HARNISCHFEGER CORPORATION
• MILWAUKEE 46, WISCONSIN

the P&H Line

DOW

DOWFROTH 250, AN IMPROVED FROTHER AT LOWER COST

DOW'S quality frothing agent raises concentrate grade—increases recovery—with reduced frother consumption!

In many mills today, Dowfroth* 250 is producing improved metallurgy with as little as one-fourth the consumption of previous frothers used. This translates into increased profits and substantial savings in your mill operation.

Dowfroth 250 is easy to use, too . . . it requires minimum conditioning time for stage addition; its water solubility permits accurate regulation as a water solution, if desired; and it demonstrates little or no collecting power, allowing you freedom to regulate frother and collector independently.

As a pioneer producer of Xanthates, Dow has built up extensive facilities for the manufacture of flotation agents, assuring you adequate supplies of Dow Xanthates and Dowfroth 250 of dependable high quality at all times.

Prove, in your own mill, the economy and efficiency of Dowfroth 250. For a test sample of this dependable frother, write to THE DOW CHEMICAL COMPANY, Midland, Michigan, *Dept. OC 1806J.* *Trademark

you can depend on DOW CHEMICALS DOW

SYDVARANGER SAMPLES

Thank You Mr. Kraft Johanssen

Dear Sir:

Thank you for sending me a copy of the October issue of MINING WORLD airmail. I think you have succeeded with the description of the Sydvaranger operations very well indeed. Even for me it has been very interesting to read. I quite recently returned from a trip to the United States and know that many engineers in the United States appreciated the articles in the "Sydvaranger Issue" and the information given therein.

J. Kraft Johanssen
Managing Director
Aktieselskabet Sydvaranger
Oslo, Norway

Taconite or Jasper Interest

Dear Sir:

Naturally all of those in the taconite or jasper concentration field will be very interested in going through this special issue. I think a very excellent job has been done on this.

Grover J. Holt
General Manager,
Cleveland-Cliffs Iron Company
Ishpeming, Michigan.

Embassy Interested Too

Dear Sir:

The Sydvaranger issue has been studied with great interest. We are glad you have found it feasible to devote a whole issue to this, for us, very important mining development.

Dag Havreold
Commercial Attache,
Norwegian Embassy
Washington, D. C.

Why Not Jet Pierce?

Dear Sir:

It is indeed interesting to note how closely the ore deposit and processing at Sydvaranger parallels that of Reserve Mining Company. Seemingly it would be very desirable to use jet piercing for blast holes, but perhaps fuel and oxygen would be too costly.

V. D. Johnston
Oglebay, Norton and Company
Cleveland, Ohio.

In the Norwegian location jet piercing is not economically practical or feasible. The main reason is the high cost of imported liquid fuels, as indicated by Mr. Johnston. Manufacture of oxygen would also be expensive. In favor of churn drilling is the lower cost of manpower and its greater availability.—Ed.

MINING WORLD

Including the Export Edition **WORLD MINING**

Published monthly except in April when publication is semi-monthly

VOLUME 16 **JANUARY 1954** **NUMBER 1**

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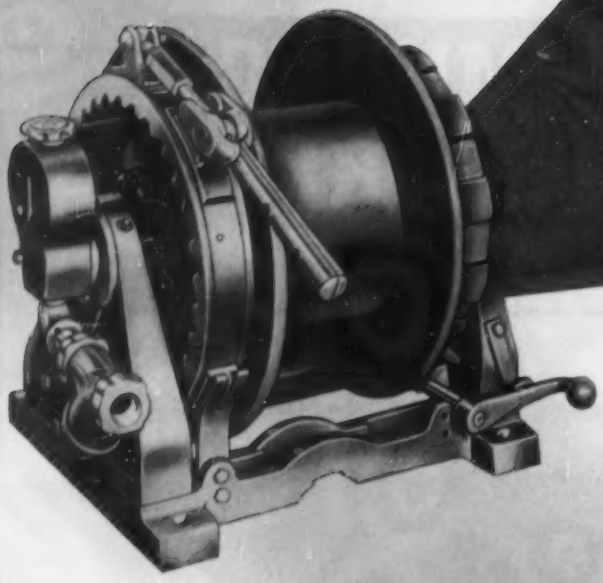
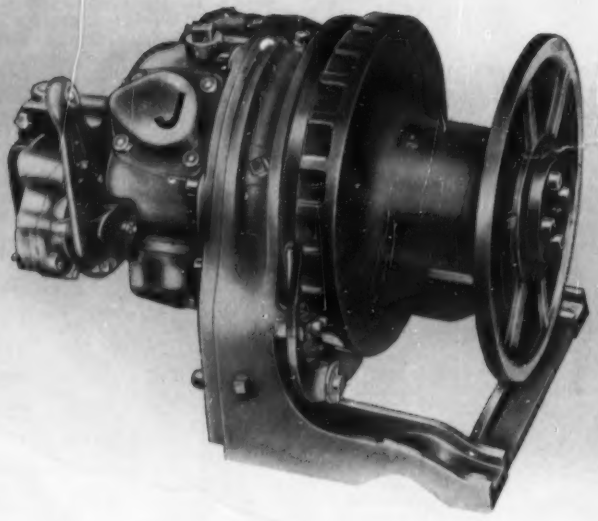




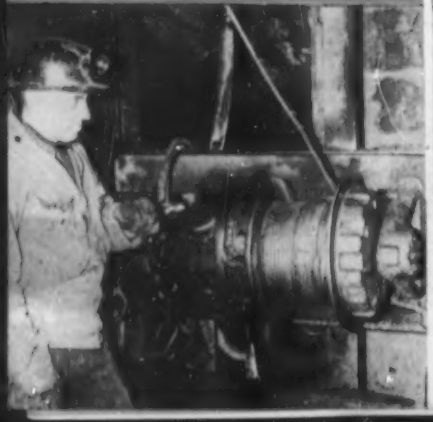
TOP: Model F-113 "Turbinair". Compact, simple design with motor *inside* the drum. Direct power transmission from motor to drum assures maximum efficiency. Simple, accessible controls make operation easy.

RIGHT: Model DW-111 "Pistonair". Features reversible power with light weight. Four-cylinder, 3½ h.p., reversible motor will handle up to 1200 lbs.

FAR RIGHT: Model L-111 "Pistonair". For heavy hoisting jobs. 7½ h.p., reversible, five-cylinder motor for loads up to 2000 lbs.

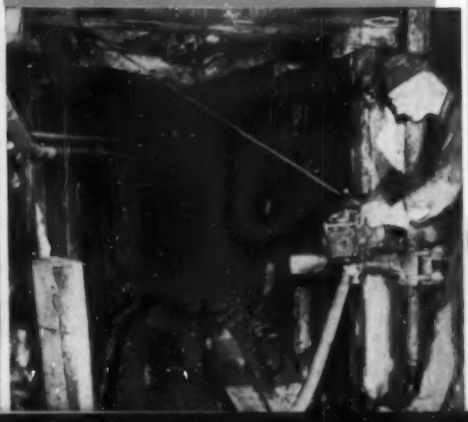
OVER 100 YEARS OF ENGINEERING LEADERSHIP

Joy L-111 reversible "Pistonair" Single Drum Hoist operating in a magnetite iron mine in the Adirondack region of New York.



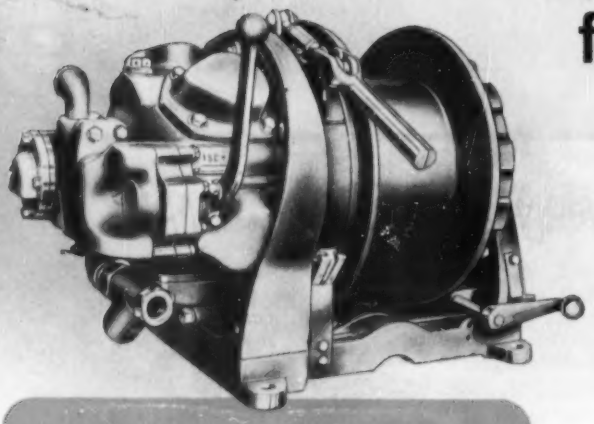
Joy L-112 "Turbinair" lifting timbers in a raise in a western mine. The extra rope capacity of the F-112 (450' of ⅜" rope) makes it applicable to many of the utility hoisting needs in this mine.

Joy AW-80 Air Winch hoisting timbers into place in a drift in a Canadian mine. At a weight of only 65 lbs., this unit will lift 500 lbs!



BETTER SERVICE from

SINGLE DRUM HOISTS



They're real Mining Hoists—designed and built from long field experience expressly for underground use

Joy Single Drum Mining Hoists are compactly designed, of modern, high-strength alloy metals, for lighter weight with greater power and efficiency.

The complete Joy line includes the "Turbinair" series which develop maximum horsepower per unit of weight; the "Pistonair" with reversible four or five cylinder motors; and compact, rugged electric-powered models which feature space-saving short-length external motors.

Joy Single Drum Hoists are built with lifting capacities ranging from 500 to 3500 lbs., and rope capacities from 150 to 1500 ft. "Pistonair" models have a positive acting safety brake which holds the load in any position when the throttle valve is "off."

Joy also manufactures a complete line of Shaft Hoists, and Two- and Three-Drum Slusher Hoists in capacities to handle all hoisting and scraping needs.

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16 mm-Sound and Full Color-40 Minutes

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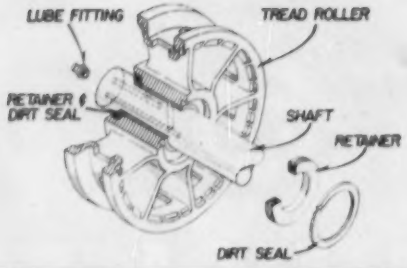
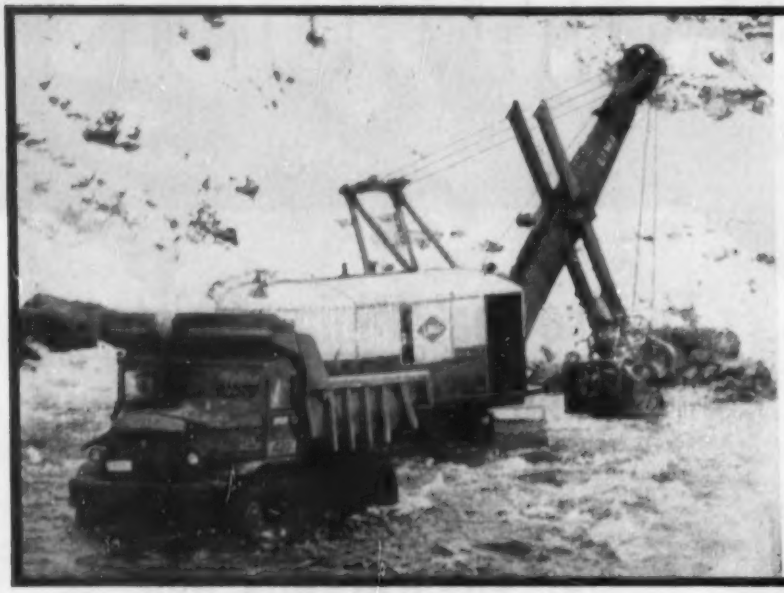


LIMA DIRT SEALS
CUT DOWN-TIME AND MAINTENANCE COSTS



This LIMA shovel, demonstrates the importance of LIMA'S dirt seals and grease retainers.

In such work, abrasive material which wears out the bushings and shafts of ordinary shovels is excluded. LIMA seals the lubricant in and dirt out, thereby reducing friction and prolonging the life of bushing, roller and shaft.

COMPARE! No other machine gives you as much as LIMA!

1. Bronze bushings in tread, idler and drive rollers are protected by piston-type dirt seal rings and retainers.
2. All gears, smaller parts and shafts which are subject to extra wear are flame or induction hardened for longer life.
3. Main machinery is placed well back of center of rotation to eliminate excess counterweight.
4. Anti-friction bearings, used at all important bearing points, reduce destructive friction, fuel consumption and lubrication requirements.
5. Big capacity drums and sheaves lengthen cable life by reducing the need for double wrapping and sharp bends in cable.
6. Full air controls on travel, hoist, swing and boom hoist, result in smoother, more precise operation, minimum maintenance and less operator fatigue.
7. Torque converter (optional) automatically adjusts speed to load requirements, minimizing shock loading, making performance smoother and faster.
8. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

COMPARE and you'll specify LIMA for shovels (¾ yd. to 6 yds.), cranes (to 110 tons) and draglines (variable).

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DRAGLINES • PULLSHOVELS

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

BALDWIN-LIMA-HAMILTON CORPORATION
Construction Equipment Division
LIMA, OHIO, U.S.A.

pass through these six 24" dia. DorrClones*!

This compact installation of six 24" dia. DorrClones, is located in the by-product plant of a large mineral producer in the Western United States. 9000 tons per day of minus 65 mesh flotation tailings are deslimed and dewatered prior to gravity concentration of wolframite, cassiterite, etc. DorrClones were selected for this operation for three reasons.

FIRST — A relatively fine separation was required at low dilution without dispersing agents.

SECOND — Space and headroom were severely limited.

THIRD — The initial cost was lower than for any other type of classification equipment.

Over a three months period, operating data have averaged as follows:

	FEED	OVERFLOW	UNDERFLOW
% Solids	35.9	27.0	61.2
GPM	542	432	110
TPD Solids/unit	1500	842	658
% Recovery		56	44
MESH	**CUMULATIVE % PLUS THE MESH**		
65	5.3	1.1	15.4
100	15.8	2.6	40.2
150	28.4	6.8	60.1
200	42.9	18.1	75.8
—200	57.1	81.9	24.2

If you have a desliming problem, there's a good chance that the DorrClone, with its high-capacity-for-size and ability to handle flocculant or heavy pulps, will be the solution. For further information write for Bulletin No. 2500, The Dorr Company, Stamford, Conn.

* DorrClone is a trademark of The Dorr Company, Reg. U. S. Pat. Off.

Better tools TODAY to meet tomorrow's demand

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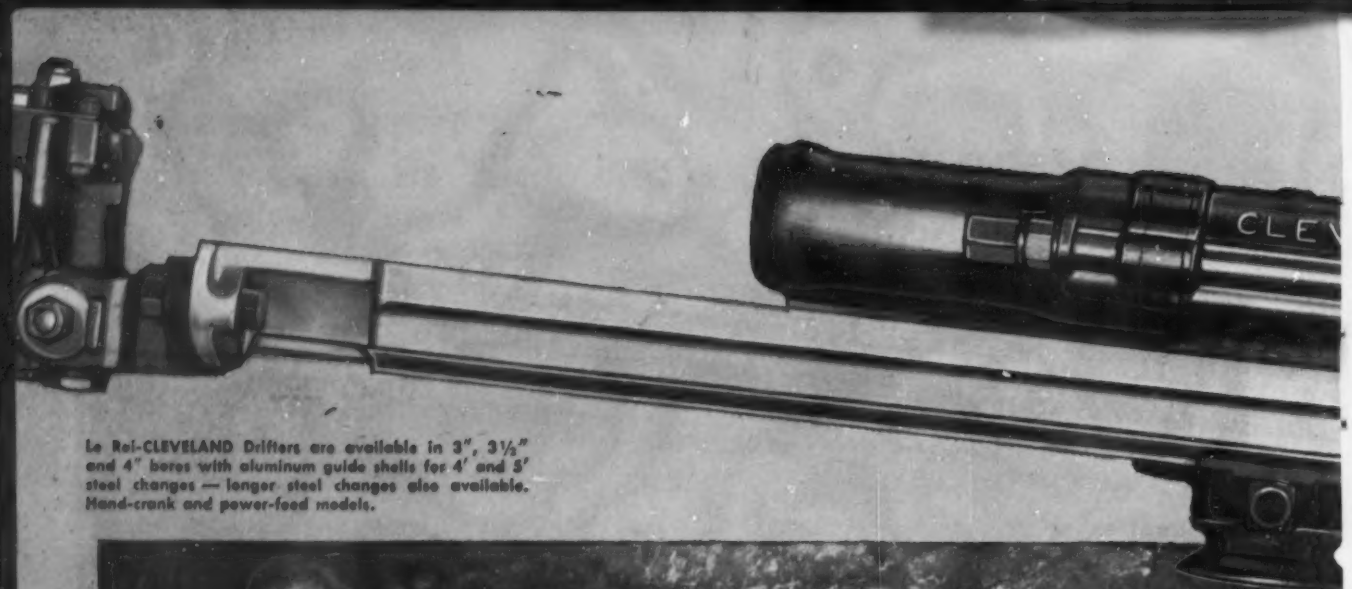
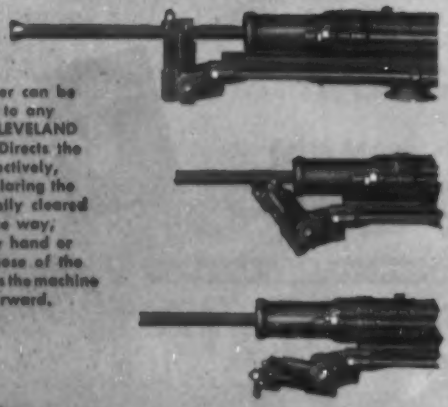
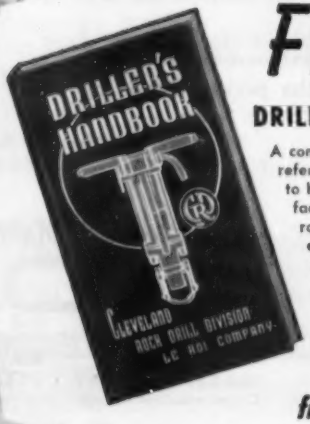


Le Roi-CLEVELAND Drifters are available in 3", 3½" and 4" bores with aluminum guide shells for 4' and 5' steel changes — longer steel changes also available. Hand-crank and power-feed models.

Le Roi-CLEVELAND Power Feed Drifters and Jumbo Booms.



Centralizer can be attached to any Le Roi-CLEVELAND Drifter. Directs the steel effectively, when collaring the hole. Easily cleared out of the way, either by hand or by the nose of the drifter, as the machine is fed forward.



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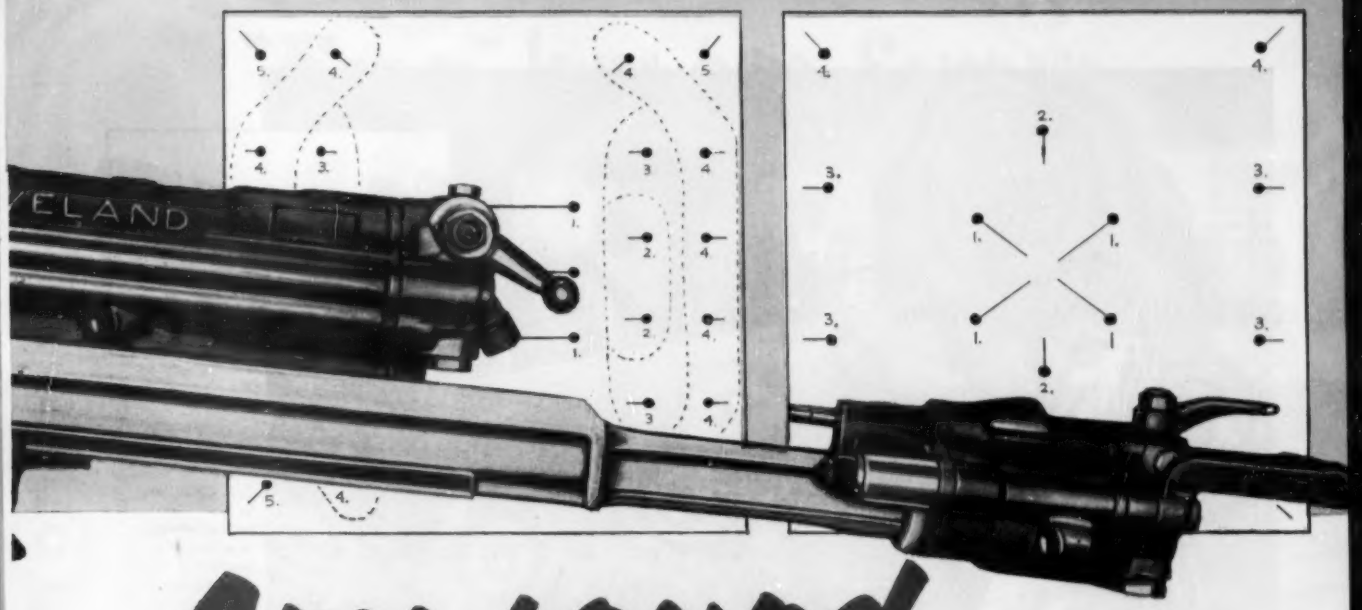
A completely revised, pocket-size reference book you won't want to be without. Gives you useful facts it pays to know about rock drills — lubrication, operating, maintenance, shanks and bits, compressed air lines, drilling and blasting, machine mountings, wet drilling, dry drilling, and other information.

Write for your free copy today!



Any round goes faster!

— with Le Roi-CLEVELAND Drifters and aluminum guide shells for 4′ or 5′ steel changes

No matter what pattern they use, your miners drill out the round faster with Le Roi-CLEVELAND Drifters.

It's easy to see why: Le Roi-CLEVELAND Drifters are easier to handle. And they have high drilling speed — plenty of rotation power — a wide selection of steel changes. In short, Le Roi-CLEVELAND Drifters have what it takes to drill more feet of hole per shift.

And — since they help raise your tonnages, they help cut your costs, too. That's because they use air economically — and because they're built "tough" to stay underground where they can do you the most good.

Yes, sir, Le Roi-CLEVELAND Drifters are "just what the doctor ordered," to speed up your drilling cycles, increase your footage, and lower your drilling costs. Ask your Le Roi representative for the whole story.

Write for free Bulletin No. RD25.

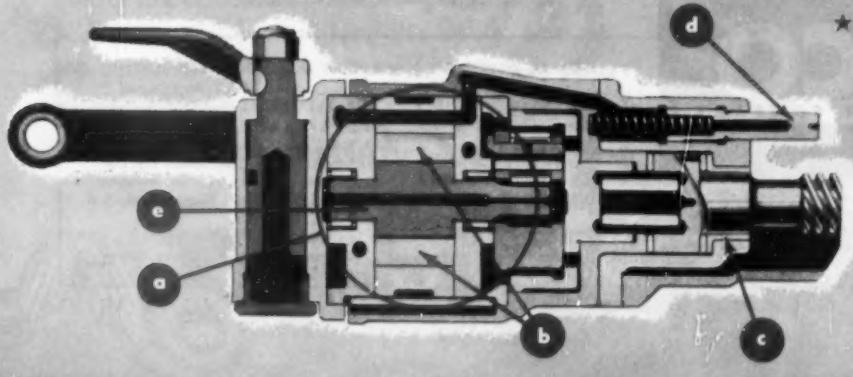
CLEVELAND ROCK DRILL DIVISION

Le Roi Company *A Subsidiary of Westinghouse Air Brake Co.*

12500 BEREA ROAD • CLEVELAND 11, OHIO • *Plants: Milwaukee, Cleveland and Greenwich, Ohio*

Advantages of Le Roi-CLEVELAND Power Feed

★ *Faster steel changes!* ★ *Constant rate of drilling!* ★ *Reduced operator fatigue!* ★ *More footage per shift!*



a. Motor proper is vane-driven, double-lobe type. Power is applied at diametrically opposite points of rotor — for better feeding action, more constant torque.

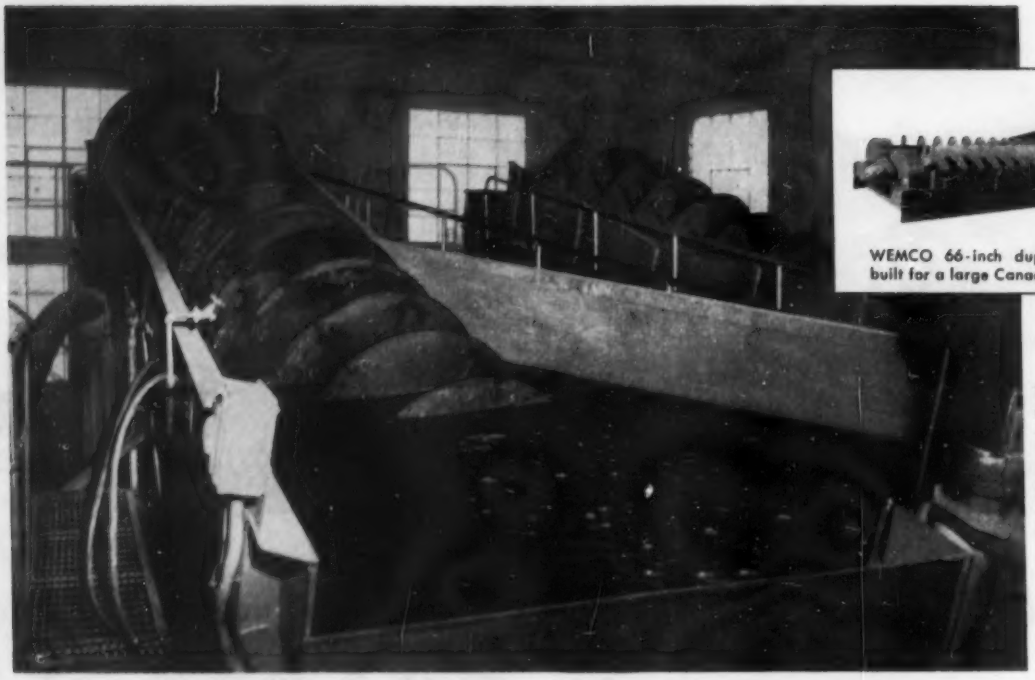
b. Vane-type design provides fast, positive feeding — uses little air.

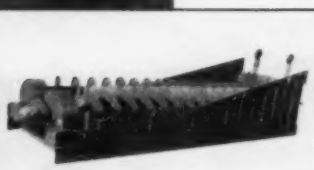
c. Floating-joint construction and thrust washers absorb shocks, reduce upkeep.

d. Exclusive automatic shut-off valve prevents drifter from hitting feed motor, when changing steels.

e. One-piece rotor is carried on roller bearings at both ends. The three intermediate gears also operate on roller bearings.

RD-5





WEMCO 66-inch duplex classifier built for a large Canadian operator.

Two 60-inch, series 150 WEMCO S-H Classifiers in the regrind circuit of a large lead-zinc concentrator.

for better Classifier performance

in terms of

- *Less Oversize in Overflow*
- *Less Undersize in Sands*
- *Lower Operating Costs*
- *Longer Continuous Operation*
- *Greater Capacities*

—use ***WEMCO*** *S-H Classifiers*

These Exclusive Mechanical Features *of WEMCO S-H Classifiers are among the important reasons why* ***only*** *the WEMCO unit gives you these better performance factors — with the result that more and more operators throughout the world are choosing WEMCO for their classification jobs.*

1. **40% greater shaft strength,** for protection against shutdowns, is provided by WEMCO's large diameter tubular shafting.
2. **Longer-life wearing shoes** of tough, thick alloy and large cross-section, short cast steel flight arms. Shoe replacement costs have been reported as low as 4/100 of 1 cent per ton.
3. **Foolproof, efficient bearing units** are of the anti-friction type. Lower unit is grit-proof; upper unit is gudgeon type mounted on hub of bevel gear, designed for extra long life.
4. **Simple, hydraulic lifting device** gives uniform action and complete protection from clogging or jamming.
5. **Smooth, efficient drive** uses standard speed motors and a new type cone gear reducer for maximum efficiency of power transmission.

Consult with WEMCO today on your classification problems. Competent engineering of your inquiry will be handled promptly and places you under no obligation.

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Corporation Commercial Sudamericana S. A.
Casilla 505, Lima, Peru
The Sumitomo Machinery Co., Ltd.
5-22 Kitahama, Higashi-Ku, Osaka, Japan

"Euc" lever-type Scrapers

Pay off in Performance

Getting a heaped load of 21 cu. yds. at Jemez Dam in New Mexico.

- 15.5 cu. yds. struck
- 275 h.p. engine
- 10-speed transmission
- Interchangeable hydraulic jacks
- 4-section reversible and interchangeable cutting blades
- Lever actuated bowl, apron & ejector—only 13 ft. of cable

Lever action, an exclusive Euclid Scraper development, offers many profit-making advantages that you can't get in any other scraper. It is the most important advancement in scraper design and performance in many years!

Just think of it—no cables to break because bowl and apron lift and the positive roll-out ejector are actuated by interchangeable hydraulic jacks. Only 13 feet of long-life cable, part of the apron lift, are used. There's no danger of a broken cable causing damage or delay—ever, and especially on high speed hauls. There's no costly cable replacement and lost time threading cable through dozens of sheaves and pulleys. And most important of all is the top performance and high job availability—the low cost production—you can count on with "Eucs" on your job.

Get the complete story from your Euclid distributor and check all of the features that mean more loads and bigger payloads per hour at lower cost. Just ask for your copy of Form B502.

EUCLID DIVISION, GENERAL MOTORS CORPORATION, CLEVELAND 17, OHIO

Cable Yuklid—Code Bentley

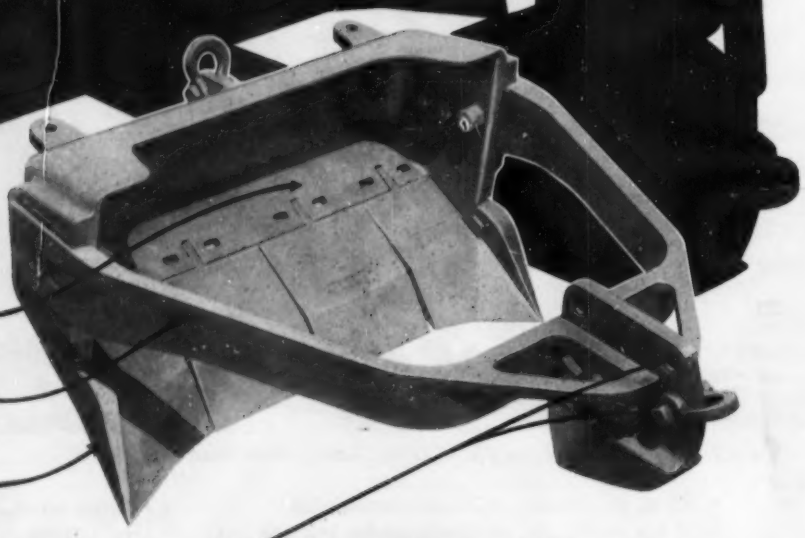
Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

Proved by Performance!

Pacific SLUSHMASTER SCRAPERS

U.S.A. and Foreign Patents Applied For



LOW CENTER OF GRAVITY ★
Weight is concentrated over blades and side cutters.

HARNESS DESIGN ★
Acts as curved bumper to by-pass obstructions.

POSITIVE DIGGING ACTION ★
Blade and side cutter design of "Slushmaster" is such that all models will immediately secure a load in a single pass, regardless of size or type of material or slope of muck pile.

ADJUSTABLE DIGGING ANGLE ★
Shackle may be changed to different locations on shoe. 2 or 3 holes are provided, depending on size of scraper.

EASY DISASSEMBLY ★
Can be taken down into four parts. Easy to move into any working place.

ALLOY STEEL & METALS CO.

USERS SAY:

"You have to see 'em work to believe it,"...
"It's the 'slushingest' bucket I've ever seen,"...
"Best breast cleaning scraper ever designed,"...
"First scraper I ever saw that is a REAL scraper."

OUTSTANDING FEATURES:

Streamlined design. Rugged construction throughout. Simplified method of attaching blades and side cutters... change them in 15 minutes underground. Special Alloy Steel blades and side cutters designed for maximum toughness and wear resistance. Complete line – nine different models from 26" to 60" widths – 398 lbs. to 2275 lbs. Send for Bulletin No. 215.

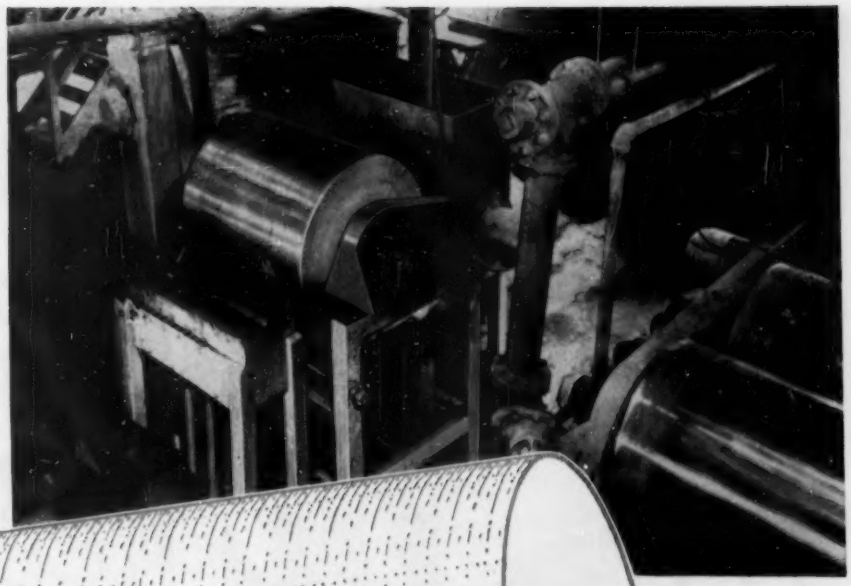
ALLOY STEEL & METALS CO.

1848 EAST 55TH STREET, LOS ANGELES 58, CALIFORNIA

Mailing address: Box 15323 Vernon Station, Los Angeles 58, California

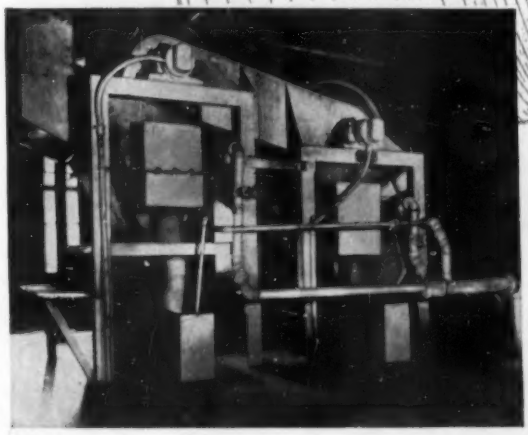
BE SPECIFIC—ORDER PACIFIC

For added efficiency, use Pacific Sheave Blocks, Sheave Anchors, "Round-The-Corner" Sheave Blocks, Jaw Crushers, Bit Knockers and Pacific Wearing Parts.



Jeffrey Counterflow Rougher and a Two-Drum Jeffrey-Steffensen Separator at Scrub Oaks

Jeffrey Drum-Type Magnetic Separators Simplify Flowsheets, Increase Recoveries



Type C-2 Cobbers in operation at Oxford

Alan Wood Steel Company, Conshohocken, Pa., has simplified flowsheets and improved metallurgy by converting its mills at Scrub Oaks and Oxford to Jeffrey Drum-Type Magnetic Separators. The installations have resulted in an increase in recovery and sizable savings in floor space requirements.

Scrub Oaks mill will utilize 11 drums, including Type C-2 Cobbers for primary roughing . . . Counter-flow Type Roughers on both rod and ball mill products . . . Jeffrey-Steffensen Two-Drum Separators for final concentration of fine products.

At Oxford two Type C-2 Cobbers with a common drive handle #20 mesh portion of roll crusher product, producing a final concentrate, a low-grade tailing, and a middling product that returns to crusher in closed circuit.

Write for descriptive literature and technical data

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

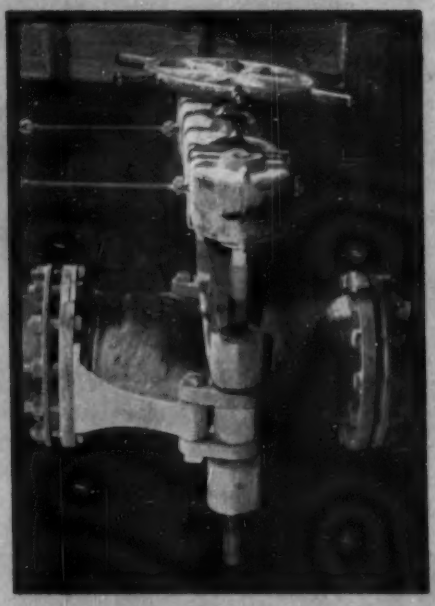
sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED . . . IT'S A JOB FOR JEFFREY!

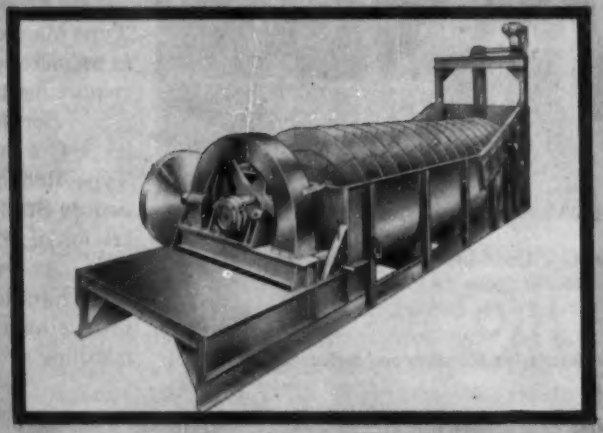
at New Jersey Zinc,

MARCY MILLS



MASSCO-GRIGSBY
RUBBER PINCH VALVES

WILFLEY TABLES



AKINS CLASSIFIERS

too . . .

Like so many other successful mining companies, The New Jersey Zinc Co. relies on M & S and CIW products for dependable low-cost mechanical operation and efficient metallurgical performance.

M & S and CIW at NEW JERSEY ZINC

GILMAN

4—54" Akins Simplex Classifiers
1—24" Akins Simplex Classifier
4—4' x 10' Marcy Rod Mills
2—2' x 4' Marcy Rod Mills

DEPUE

1—5' x 10' Marcy Rod Mill

OGDENSBURG

1—3' x 6' Marcy Rod Mill

HANOVER

3—54" Akins Simplex Classifiers

PALMERTON

1—5' x 10' Marcy Rod Mill
1—5' x 12' Marcy Rod Mill

AUSTINVILLE

2—8' x 12' Marcy Rod Mills

FRANKLIN

36 —Wilfley Tables

LET OUR ENGINEERS SHOW YOU THE REASON WHY SO MANY COMPANIES CHOOSE MARCY AND AKINS...SEE PROVED RESULTS FROM ALL KINDS OF GRINDING AND CLASSIFICATION INSTALLATIONS.

The Mine & Smelter Supply Co.

Denver 17, Colorado

OFFICES IN SALT LAKE CITY, EL PASO, 1775 BROADWAY, N. Y. C.

AND ITS SUBSIDIARY COMPANY **COLORADO IRON WORKS CO.**

Denver 2, Colorado

Sales Agents and Licensed Manufacturers in Foreign Countries

ENGINEERING SIDELIGHTS OF THE EMPIRE STATE BUILDING:

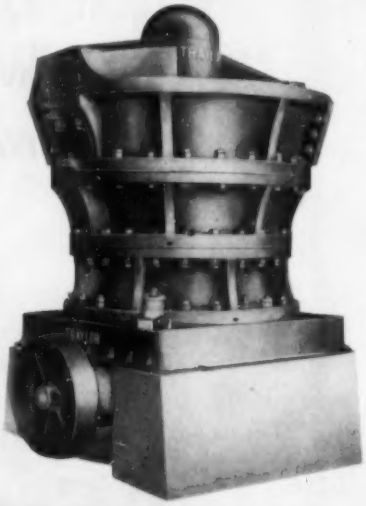
Construction of the world's tallest building in 1931 was so well coordinated that builders erected 10,000 tons of steel per month in the heart of busy Manhattan without blocking traffic in the City's streets. After the first six floors, workers raised steel at the rate of one floor per day until completion of this 1,250-foot, 102-story skyscraper. Perfect planning and smooth teamwork made this a truly outstanding example of modern engineering achievement.

Modern Construction Demands Improved Materials

For over half-a-century Traylor Engineers have worked closely with industry in creating equipment that's "TRAYLOR-MADE" to produce better materials . . . materials that continue to keep pace with increasingly exacting demands of advanced engineering practices. The Traylor TC Gyratory Crusher is a *modern* example of this coordinated teamwork. You'll find sound engineering proof of this in Traylor Original Curved Concaves and Bell Heads. These Curved surfaces apply power efficiently as a direct crushing force to reduce lifting and churning of material in the crusher. Choking and packing are practically eliminated because each zone in the crushing chamber has greater capacity than the preceding zone . . . reduced material has free fall from the discharge end. These achievements of Traylor Engineering assure a more uniform product to meet the constant demand for better materials. Traylor bulletin 126 gives complete specifications for all Traylor Gyratory Crushers. Send for your free copy today.

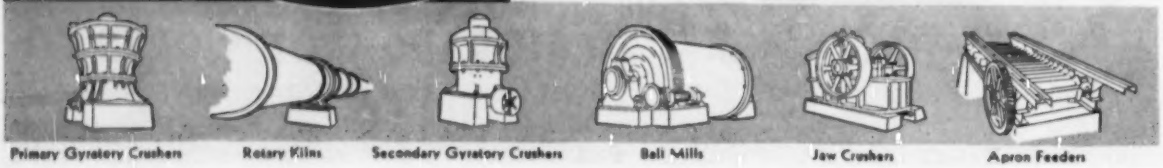
Traylor's Big 60" TC Gyratory has the Capacity to reduce 303,000 tons of material (weight of the entire Empire State Building) in less than 106 hours.

Traylor TC Gyratory Crushers are built in seven sizes with feed openings from 20" x 80" to 60" x 210".

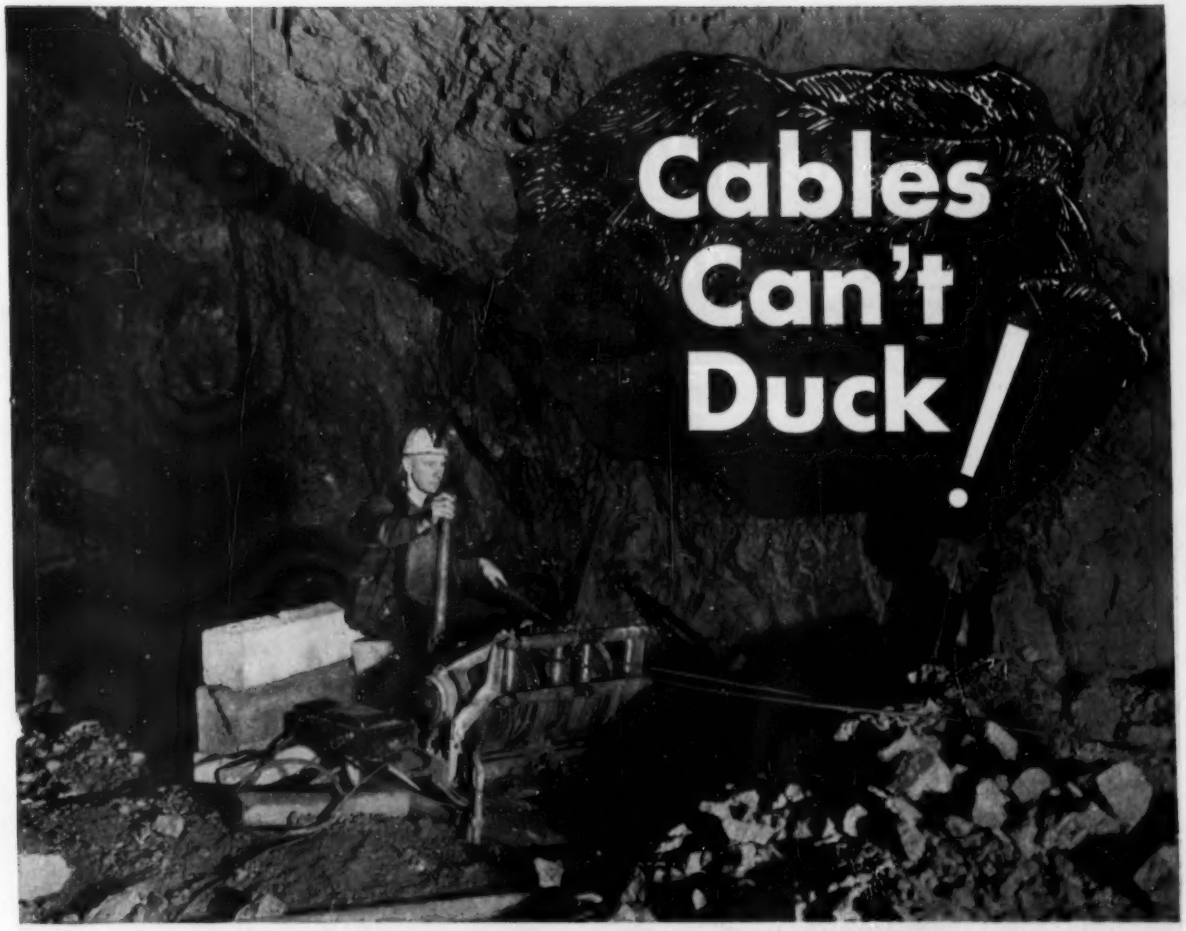


TRAYLOR ENGINEERING & MANUFACTURING CO.
603 MILL ST., ALLENTOWN, PA.

SALES OFFICES: New York • Chicago • San Francisco
CANADIAN MFRS: Canadian Vickers, Ltd., Montreal, P. Q.



Primary Gyratory Crushers | Rotary Kilns | Secondary Gyratory Crushers | Ball Mills | Jaw Crushers | Apron Feeders



Portable cables for slusher hoists can't duck flying pieces of ore, spalling rock, water and mechanical abuse. They have got to stay put and take it. For these reasons you need more than a good power cable; you need the best that money can buy. Cables that can stand up under these tough operating conditions are the only kind that can help turn in a profit. The profit-making, loss-preventing kind is TIREX.

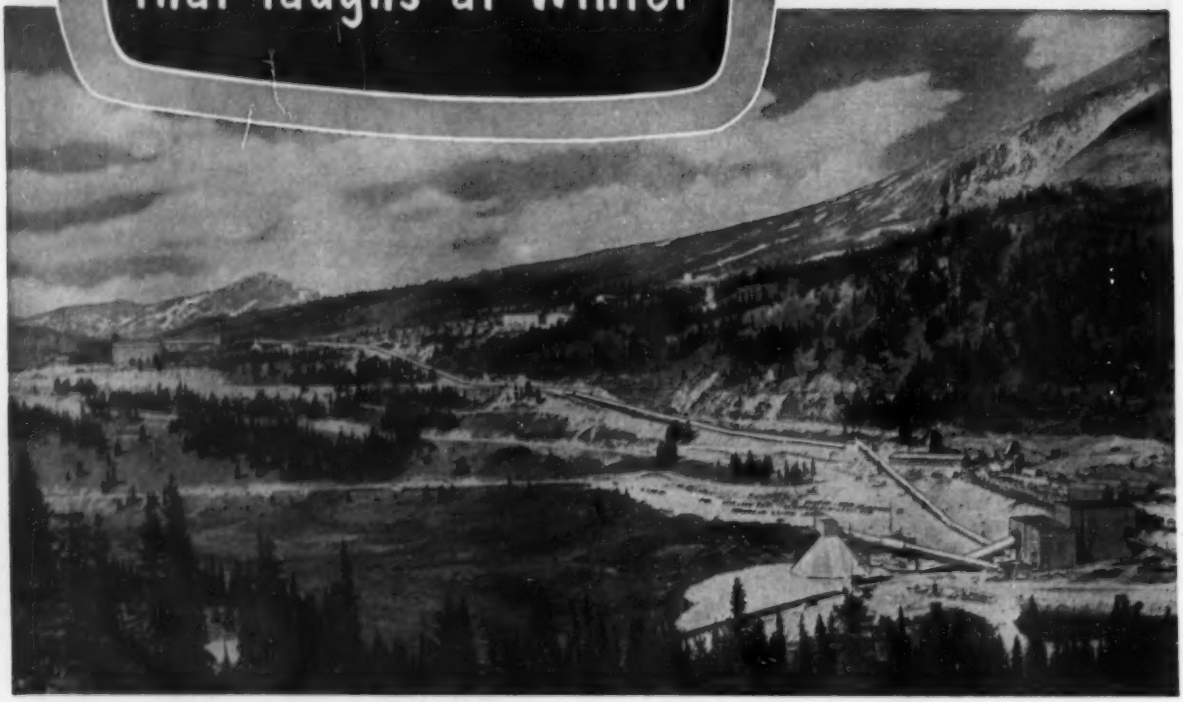
Simplex-TIREX power cables have a *tough, cured-in-lead, selenium-neoprene armor* to assure extra-long life. This special armor gives balanced resistance to abrasion, water, grease, oil and flame. It is this special balance of properties that makes TIREX Cables last longer and thus enables you to scrape more tons of ore.

Remember to specify and get Simplex-TIREX Cables for all your portable operations, including slusher hoists. These cables are marked "Simplex-TIREX" for your protection.

Simplex WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

A rubber railroad that laughs at Winter



In rugged "high country" famed for tough weather, a large western mining company wanted to move ore at an ultimate capacity of 2,000 tons per hour for a distance of nearly a mile and a gain in elevation of some 350 feet . . . and maintain capacity in mid-winter as well as in summer.

Stearns-Roger designed and constructed a conveyor system that does the trick. Its 42" wide belt operating in four sections, is housed in a barrel-ceiling enclosure. This structure is fully insulated and is heated by electricity for efficient operation even when outside temperatures slide to minus 30° F.

Here again, Stearns-Roger has demonstrated its ability to employ basic methods of known efficiency and economy, and to adapt those methods to special operating conditions.

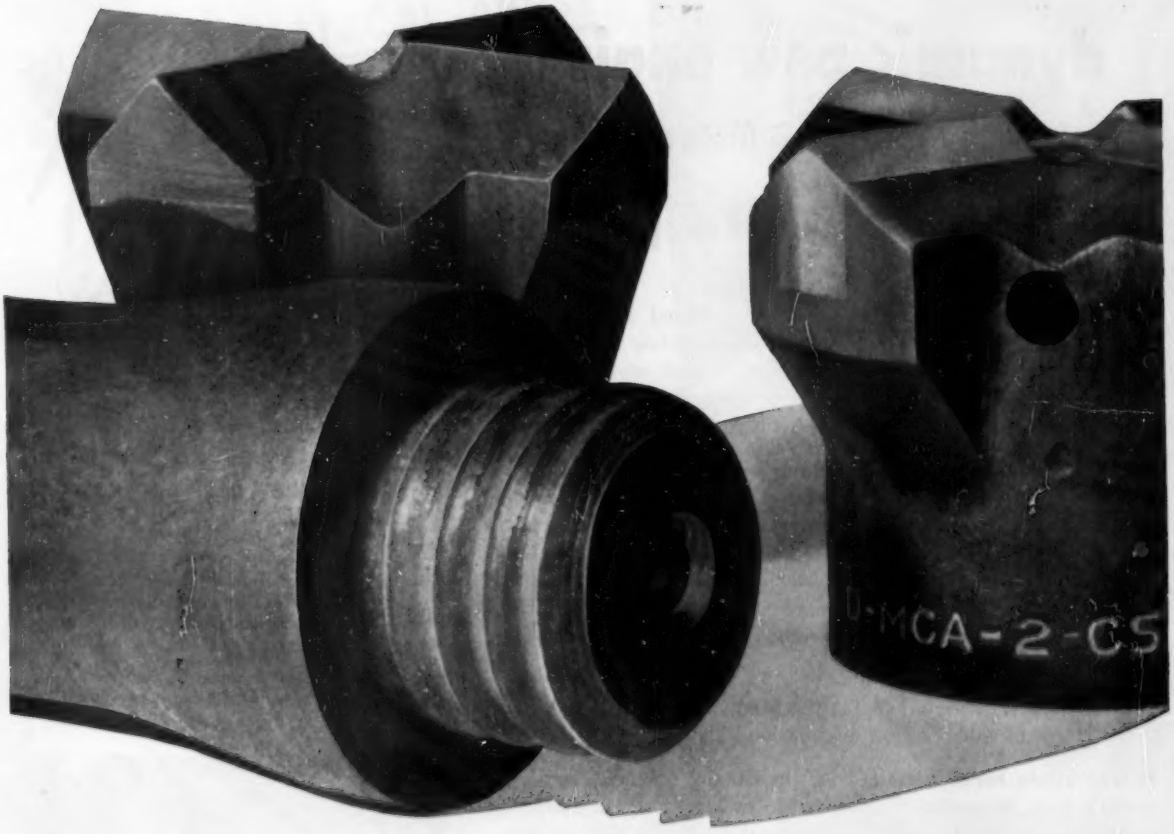
Look to **Stearns-Roger** for undivided responsibilty in

ENGINEERING
DESIGNING
MANUFACTURE
CONSTRUCTION

Stearns-Roger

THE STEARNS-ROGER MFG. CO. DENVER COLORADO

DENVER • HOUSTON • SALT LAKE CITY • EL PASO



SWITCH BITS WITHOUT SWITCHING STEELS

DOZENS OF DIFFERENT TIMKEN® ROCK BITS FIT THE SAME DRILL STEEL

With Timken® rock bits, you can quickly change bit types as the ground changes. That's because dozens of different Timken rock bits—both multi-use and carbide insert—fit the same drill steel. When the ground changes, it takes just a minute to screw one type of Timken bit off, screw the other type on.

You don't waste drilling time by going after a different set of drill steels every time a different type of bit is needed.

You can cut your drill steel inventory, too. And you can save even more money because your drillers always can use the most economical bit for the job.

Both Timken multi-use and carbide insert bits give you two additional advantages: 1) they're made from electric furnace Timken fine alloy steel, 2) they have a special shoulder union that keeps the drilling impact from damaging threads.

Get help with your drilling problems from our rock bit engineers. They're experts at cutting costs. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

WHERE TIMKEN MULTI-USE BITS CUT COSTS

Most economical for ordinary ground. With correct and controlled reconditioning they give lowest cost per foot of hole when full increments of steel can be drilled.

WHERE TIMKEN CARBIDE INSERT BITS CUT COSTS

Give highest speed through hard, abrasive ground. Also most economical for constant-gage holes, small-diameter holes, very deep holes.

. . . your best bet for the best bit . . . for every job

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

dynamic new engine

gives the popular D Motor Grader

INCREASED work power

The thousands who own Allis-Chalmers Model D's know the ability of these versatile machines to do outstanding work on both construction and maintenance jobs. Now — with extra power and added features — the Model D sets even higher performance standards in the low-cost grader field.

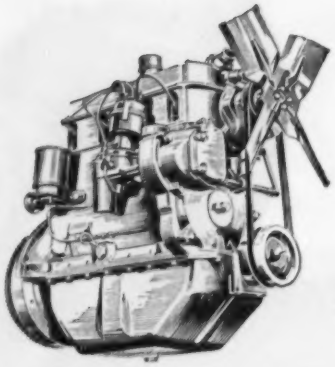
Dynamic New POWER-CRATER Engine gives the Model D reserve power to: (1) handle the same loads in higher gear or bigger loads in the same gear, (2) increase road speeds, especially where there are grades, (3) reduce need for shifting, thus lengthen clutch life, (4) give better all-round maneuverability. There's plenty of power to crowd while loading with the rear-end loader. Engine throttles down to half speed *and still does the same job* — on low-speed work.

Leaning front wheels* enable the Model D to handle new jobs . . . counteract side-draft on ditching and bank cutting.

Power circle turn* permits easy positioning of blade from operator's seat. When finishing subgrade or blacktop, for example, moldboard can be readily rotated without disturbing road surface.

These and other big-grader features — such as ground-gripping Tandem Drive, ROLL-AWAY Moldboard, Tubular Frame and Power Controls — combined with extra power make the Model D the accepted leader in the low-cost grader field. Ask your Allis-Chalmers dealer to demonstrate on your own job.

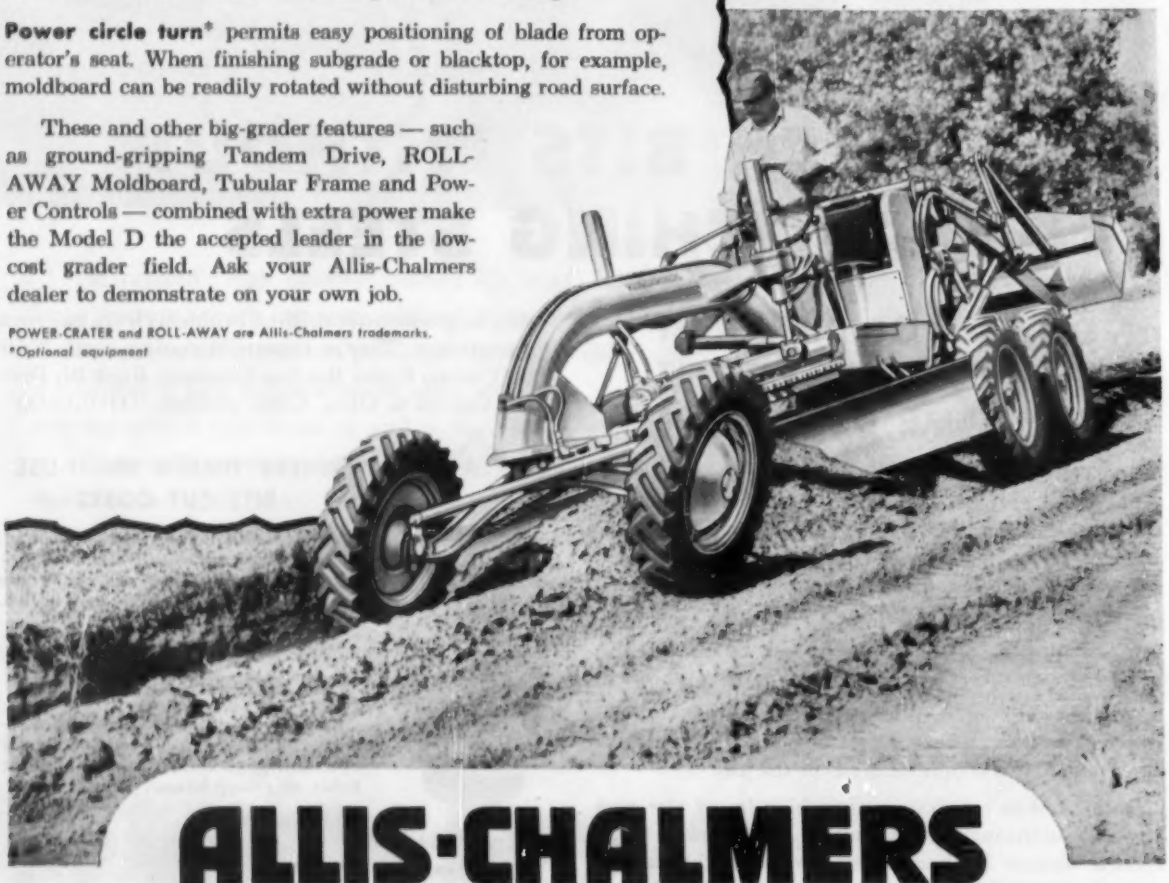
POWER-CRATER and ROLL-AWAY are Allis-Chalmers trademarks.
*Optional equipment



POWER-CRATER Engine brings *truly modern* power to the Model D

This new engine boosts power while using less fuel per horsepower. It obtains high-octane performance when using regular gasoline. Only by watching a new Model D work can you fully realize what this modern engine adds to its performance!

Weight: 8,800 lb. (bare) • Brake Horsepower: 50
4 Speeds forward to 25.6 mph. • Reverse, 3.3 mph.



ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

MINING MACHINE CABLE

. . . AND WHY THERE'S MUCH MORE TOUGHNESS IN ANACONDA'S NEW MINING MACHINE CABLE

Your naked eye can't spot diameter differences in new cables. That's why it's important to check promptly when you *do* see variations in cable after it's been used. It has probably been crushed . . . by runovers or rib-pinching. Compression cuts may let in moisture *to shorten cable life.*

HOW TOUGH SHOULD CABLE BE?

As tough as we can make it—regardless of cost. One break in a cheap cable costs more than you can save by buying on price. The new ANACONDA Cables mean lower costs to you because they can take much more abuse. In fifteen mines recently surveyed, the average life of ANACONDA Cables on shuttle cars jumped 300% over cables used only a few years ago.

WHY THE NEW ANACONDA CABLES LAST LONGER

A stronger jacket, made from a new neoprene compound, resists heat, flame and moisture better. In wet mines, sliver-cuts that may cause shocks are less likely to occur. A new cold-rubber insulation means new toughness. Moisture-wise and puncture-wise both. A new type of stranding improves the flexibility of these cables under stress.

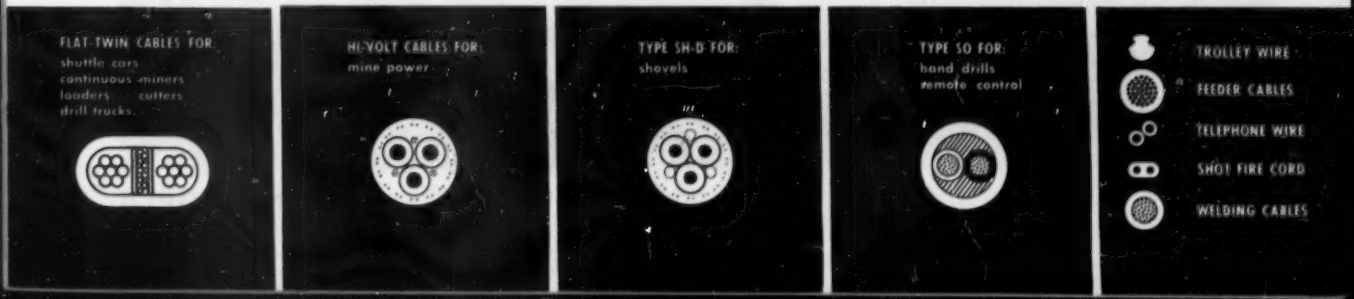
YOU BE THE JUDGE

Examine an ANACONDA Cable. See why these things are so. Call your nearest Anaconda Sales Office or Distributor for a sample. And remember: no ANACONDA Cable has ever failed a U. S. Bureau of Mines flame-test. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

55901

ANACONDA®

TODAY'S HEADQUARTERS FOR MINE CABLE



NEW MINE CARS BUILT BY SANFORD-DAY FOR METAL AND NON-METALLIC MINING

This is one of the S-D Automatic Drop Bottom Cars to be installed by Certain-Teed Products Corp. for hauling gypsum. Extra heavy steel plates were used in the construction of this car to absorb shock loads. It is another Sanford-Day development toward extending the life of cars in tough service, to increase haulage efficiency and reduce maintenance costs.

In many mines the Granby Side Dump Car is the required method of haulage. Here is a Sanford-Day built Granby Car, designed for practical construction, with re-inforcing angles and extra supporting members where needed to increase the life and service of the car. This car was built for the LePanto Consolidated Mining Co., Philippine Islands.

Regardless of Your Car Requirement, We Build it!

We show you these two Sanford-Day Mine Cars, just recently completed, because they are examples of Sanford-Day's experience and know-how in practical car design and dependable construction. These cars will also give you an idea of why so many metal and non-metallic mine operators are turning to Sanford-Day for their mine car requirements.

These operators, like yourself, are cost-minded! They know that skimpy fabrication is false economy. Consequently, they are installing Sanford-Day Cars because of their superior construction . . . extra welding . . . extra rivets and extra reinforcing where extra strength should be—cars designed and built up to service requirements for longer life and less maintenance.

Regardless of the type car you need, we build it . . . and you'll discover that an investment in Sanford-Day built cars will be money well spent.

SANFORD-DAY Iron Works

KNOXVILLE, TENNESSEE

Mack comes in costs go down

It happens all the time. A truck user finds that heavy loads, rigorous weather, or tough terrain are proving too much for the trucks he owns. Frequent breakdowns . . . interrupted output . . . excessive repairs—all conspire to boost his costs and cut his profit margin. Then—if he's smart—he switches to Mack six-wheelers.

And that's where he gets a real eye-opener. Because even under the most adverse hauling conditions—hub-deep mud, slippery sand or pitted rock-strewn ground—his Mack six-wheelers keep the big loads moving on dependable, time-saving, cost-cutting schedule.

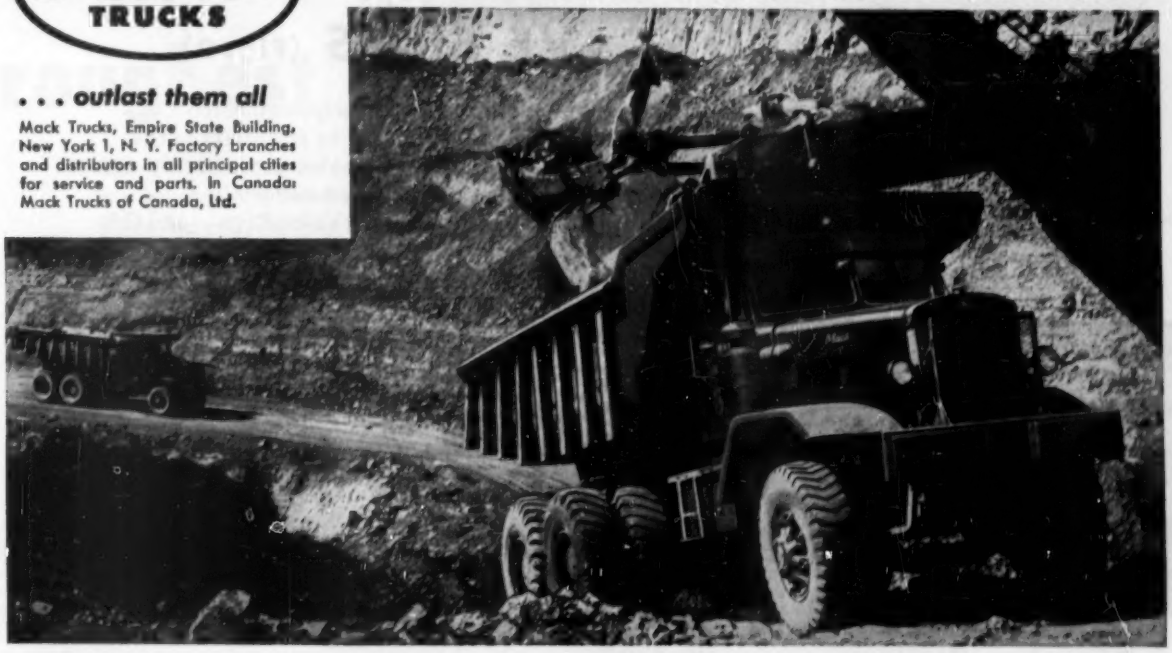
The reason why? It's found in Mack's Balanced Bogie with exclusive Power Divider that assures positive traction no matter how tough the going. Acting normally as a true differential the Mack Power Divider delivers torque between the two bogie axles in proportion to wheel traction, thus eliminating useless wheel slippage and spinning.

Mack's Balanced Bogie and Power Divider combine with numerous other outstanding Mack features to give you the power, strength, traction and easy maintenance you need to handle the biggest loads—with greater profit to you. Your nearest Mack branch or distributor will gladly give you all the facts.

. . . outlast them all

Mack Trucks, Empire State Building, New York 1, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

In tough mining and quarry operations, owners who switch to Macks consistently find that these rugged trucks are the answer to more dependable service.



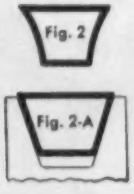
Why V-Belts with CONCAVE SIDES Last Longer!

(U.S. PAT. NO. 1813000)

Prove this yourself!

Take any *straight-sided* V-Belt (Fig. 1). Bend it—as it bends in going around a pulley. The sides will at once *bulge out* (Fig. 1-A). Clearly, those bulging sides will press *unevenly* against the V-pulley—and this causes *extra wear* at the points shown by the arrows (Fig. 1-A).

Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)



Instead of *bulging*, the precisely engineered CONCAVE SIDES merely *fill out* to *fit exactly* in the sheave groove (Fig. 2-A). The sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the Gates Vulco Rope—and this means *longer* belt life and *lower belt costs* for you!

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE Sides—the Gates Vulco Rope!

Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

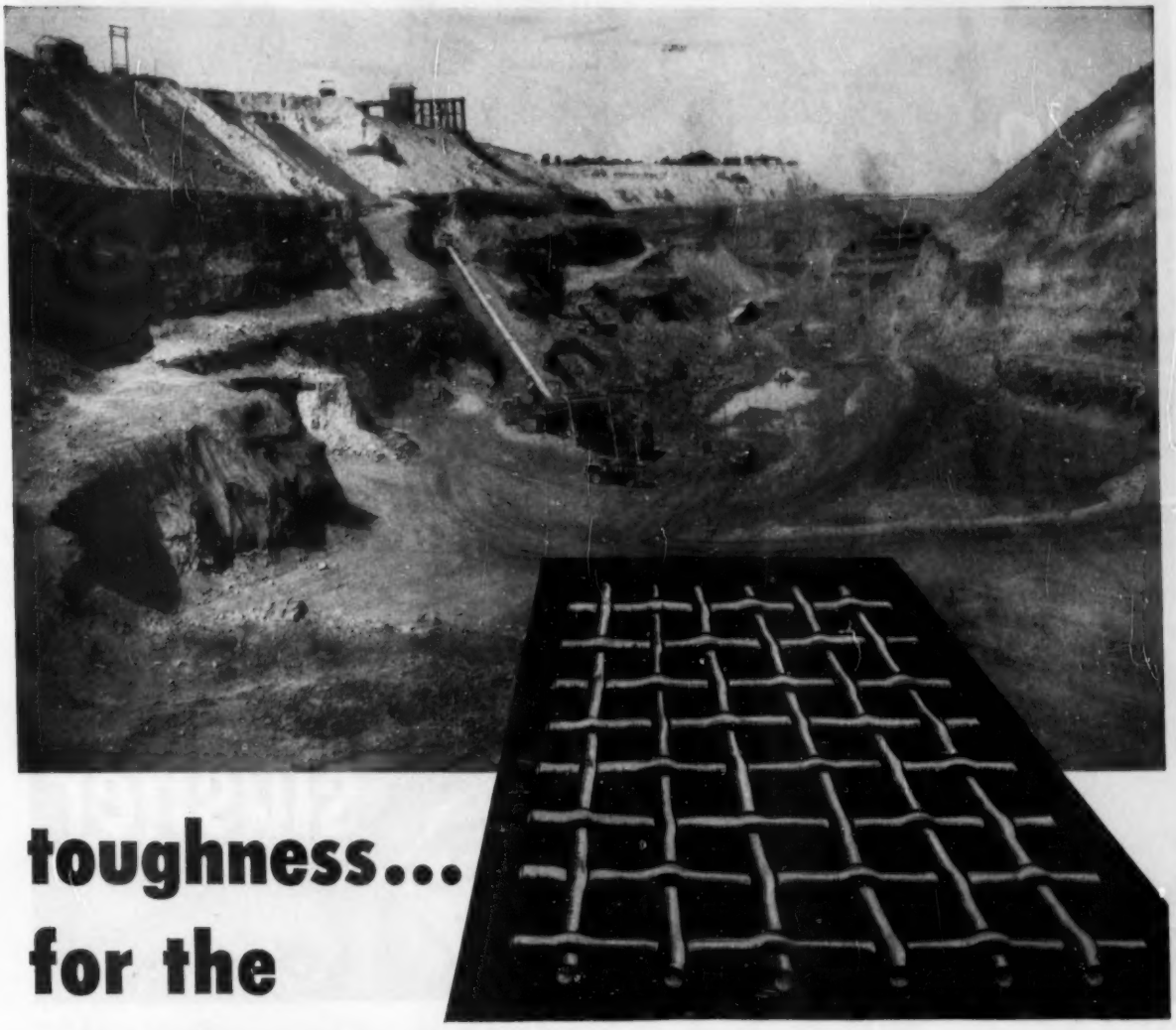
Gates VULCO ROPE DRIVES

REG. U. S. PAT. OFF.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

THE GATES RUBBER COMPANY
DENVER, U.S.A.

CA-244



toughness... for the roughest screening jobs

CAL-WIC Industrial Screens for the metal mining industry are fabricated of the toughest steels and alloys to give long life and long-run economy. Whether for processing, cleaning, grading, filtering or screening, there is a correct weave, weight and opening. Reduce downtime in your screening operations by installing CAL-WIC Industrial Screens.

Write for further information or for assistance in determining the correct screen for your requirements.

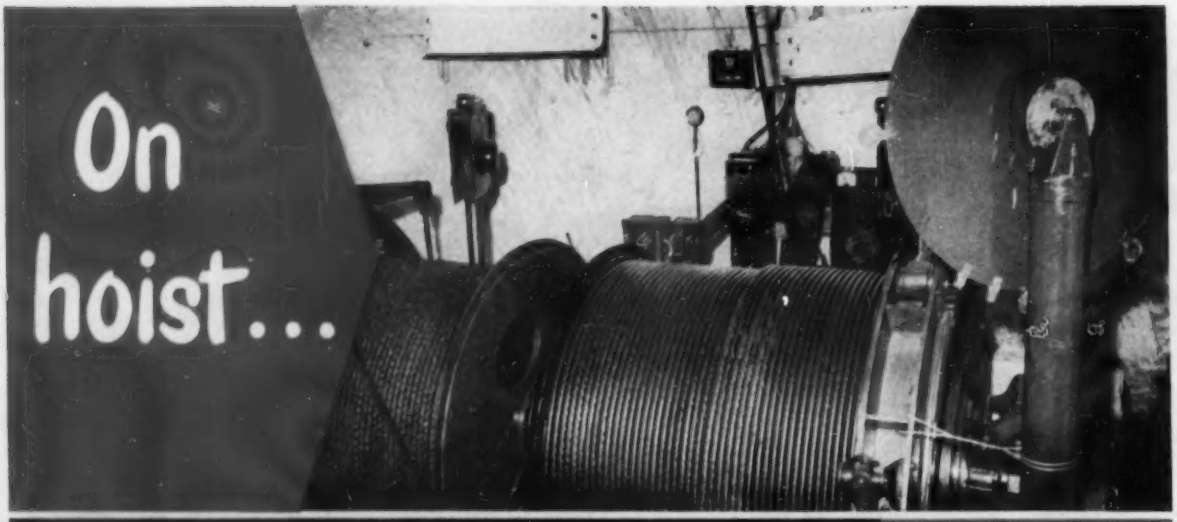
other CF & I steel products for the mining industry

Rock Bolts — Grinding Rods — Wickwire Rope
Mine Rails and Accessories — Grinding Balls

THE COLORADO FUEL AND IRON CORPORATION—Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION—New York

CAL-WIC INDUSTRIAL SCREENS
THE COLORADO FUEL AND IRON CORPORATION

2069



lower cost-per-ton because

Edwards Wire Rope stays on the job

WIRE ROPE that stays on the job with less down-time for replacement means safer operation and assures you lower cost-per-ton of material moved.

There's an Edwards Wire Rope built to give you long, trouble-free service on each specific mining operation, from hoisting to scraper work.

Technical Field Representatives are at your service on request, to help you select the right rope for every job from the complete Edwards line.

EDWARDS WIRE ROPE
E. H. EDWARDS COMPANY
General Office: SOUTH SAN FRANCISCO, CALIF., Los Angeles, Houston, Seattle, Portland

—Drifts and Crosscuts—

New Field Editor—The editorial staff of MINING WORLD was increased last October by the addition of Al Roberts, Jr. as field editor. Although a native of El Paso, Texas, Al calls Tucson, Arizona his home. He attended grammar school, high school, and the University of Arizona in Tucson.

In 1942 he switched his studies from mining engineering to pilot training in the United States Army Air Corps. Part of the 18 months he spent overseas was devoted to flying fighter missions from Iwo Jima to Japan.

After the war he resumed his studies at the University of Arizona and was graduated in 1948 with a Bachelor of Science degree in Mining Engineering. Since graduation he has worked for the Magma Copper Company in Superior, Arizona, Climax Molybdenum Company at Climax, Colorado, and Foley Brothers Inc., contractors for Kennecott Copper Corporation's Deep Ruth mine development in Ruth, Nevada.

Al has had shaft sinking and grouting experience and is currently observing sinking methods and equipment used in the Coeur d'Alenes. Hope you will like his first MINING WORLD article on page 53 describing the Northwest Mining Association's annual convention.

Evil Lives On—Many gold and silver miners have long known that the late Harry Dexter White played a very important part in the formation of the International Monetary Fund—an organization which under White's constitution has the principle of maintaining currencies at their pre-World War II ratios in terms of an ounce of gold.

There are still many in Washington who follow the thinking of the Fund in this matter. Thinking which was set by Lenin and Stalin for the purpose of destroying the United States. Thinking which was followed by the alleged Communist Harry Dexter White.

Now comes the shocking disclosure that Harry Dexter White was one of the master planners of the New Deal. A master planner who advanced the "Have Not" slogan for the United States' mineral resources. A planner who proposed that the United States conserve its raw material resources and import minerals from foreign nations—including Russian minerals, of course.

The mining industry and the American people have every right to know how many of Harry Dexter White's disciples remain in high governmental places. There have been too many reports coming from Washington following the "Have Not" line to prove that White's plan was not limited to a mere paper plan.

The following editorial points to the effectiveness of the Communistic propaganda.

How Wrong Can You Get.—The apparently well-planned and insidious campaign of well-known federal agencies, bureaus, and individuals in terming the United States a "have not nation," culminating in the issuance of the popularly termed Paley Report, has reached a point of absurdity. Prominent people with responsible positions must believe everything the government planners say. At least C. W. Dow, senior vice president and supervisor of investments of the Equitable Life Assurance Society of the United States, does. He recently said ". . . accelerating drain of our unrenewable resources has converted us from a nation rich in raw materials to a nation completely dependent on foreign sources of supply of minerals vital, not only to the maintenance of our industrial might, but crucial to the defenses of our country." His statement is so far from the truth that the Minnesota iron miner, the Arizona copper miner, and the Colorado molybdenum miner would foul their profession by acknowledging his existence.

But the greatest danger, and one which must be fought if this country is to continue to grow and prosper under the American tradition, is that "faith in America and the American system" has been lost. As a financier he should believe in America. There is plenty of unfound and unmined mineral here. Financing is a very important step in any mining project. The "have not" theorists have done their job when they get the financiers to believe that this country is ". . . completely dependent on foreign sources of supply of minerals . . ." The greatest tragedy and national harm is that the American tradition and heritage of determination, of foresight, of risk with proper reward which has made America great has been lost. Not alone the mining industry but America is lost without the American spirit and determination.

Metal Markets—Two electronics metals—germanium and selenium are in the news. . . .Demand for both is growing faster than production. . . .Curtailment of domestic zinc smelting operations may reduce output of germanium, one of the newest electronic metals. . . .Already widely used in transistors, it has a very large potential use in colored television and fluorescent lamps as magnesium germanate. . . .Production in 1953 is estimated at 10 to 11 tons as a byproduct of zinc smelting, largely from Eagle-Picher Company and American Zinc, Lead and Smelting Company. . . .Only one pound of germanium is recovered from every 2,500,000 pounds of zinc concentrate smelted at Eagle Picher's Henryetta, Oklahoma plant. . . .Selenium use in television and radio rectifiers, and for special grades of stainless steel is rising faster than production. . . . Output has gone up 40 percent to 800,000 pounds since 1951 but demand may be as high as 1,250,000 pounds this year. . . .Because of this selenium is now an important copper refining byproduct. . . .

They piled up 13,000 hours...

without overhaul

BETWEEN them, these two Caterpillar D7 Tractors with No. 7A Bulldozers have worked more than 13,000 hours before being overhauled. One has 6000 hours with no overhaul yet; the other went more than 7000 before visiting the shop. Owned by Bob Hawkins Construction Co. of Fort Deposit, Ala., they are shown 'dozing out settling basins at an iron ore stripping operation for Greenville Mining Co.

Ore averages 46-55%. Dirt must be removed regularly from the basins after settling. That means summer and winter operation for these sturdy yellow machines. Quick-starting, they need no pampering even on coldest winter days. They have stamina to work in frozen materials, and balance and traction to keep going when it's sticky underfoot. They're built to work the year around—or as far into the winter as *you* want them to work, and then get you off to an early start again in the spring.

These are all reasons why many mining operators winterize with Cat* machines. These big yellow bruisers pay off the year around with dependable high production. They stand up to equipment-busting mine work, thanks to extra-sturdy construction and special high-strength steels.

Your Caterpillar Dealer offers a wide range of tractors and matching bulldozers. He will arrange a practical, on-the-job demonstration of the dependable Cat-built team that suits your job to a "T." Call him now—and count on him whenever you need fast, skilled service and genuine Caterpillar parts.

Caterpillar Tractor Co., San Leandro, Calif.; Peoria, Ill.

CATERPILLAR*

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WINTERIZE YOUR JOB WITH CAT EQUIPMENT

CAPITOL CONCENTRATES

RESOURCE GROUPS AGREE TO DISAGREE BEFORE CONFERENCE

The Mid-Century Conference on Resources for the Future, said to be financed by the Ford Foundation and spark-plugged by the Brookings Institution, received a rude shock when, a day ahead of its opening, five organizations which were to attend withdrew from the conference. The organizations withdrawing were the National Rural Electric Cooperative Association, the National Farmers Union, the Cooperative League of the United States of America, the Public Affairs Institute, and the Regional Committee for a Missouri Valley Authority.

According to press releases, the cause of the withdrawal was the discovery that the conference had been planned "to present a 'reiteration' of corporate views on land, water and other matters." It would not be surprising were this true, but so what? R. G. Gustavson, president and executive director of the conference, issued a statement denying that the conference was "stacked."

Those attending the conference have been described as follows by the Resources For The Future: ". . . conservationists; labor officials; businessmen; social and physical scientists; officials of local, state, and federal governments; and foreign observers . . ." Of those accepting invitations before the conference started ". . . 445 came from academic institutions; scientific organizations and foundations; labor groups; and private and public conservation associations; 425 are from local, state, or federal government activities; and 363 from business and business associations.

The planners and do-gooders are still with us!

Between congressional and governmental committees —and such publications as the so called Paley Report— the facts about our resources are pretty well known. What we need is for some one to come up with the answers. As for problems relating to mining, it is hard to imagine what subjects this conference could discuss that have not been thoroughly aired at the excellent western minerals conventions.

All in all, it is a bit discouraging to read that this great group of distinguished engineering, economic and professional talent composing the conference "will record no votes, approve no resolution. It will, instead, block out areas of agreement and disagreement. No specific program for resources will be proposed; the attempt will be rather to provide a groundwork for policy-making by private and public agencies."

These are high-sounding words, but what we really need is practical action, not an estimate of what may happen 25 years from now, as useful as that might be. While all this talk continues, we feel as did the Indian who succinctly remarked, "Squaw and papoose still hungry!"

• *Social Security Tax Rate Increases*

The social security tax rate goes up 0.5 percent on January 1, 1954. The scheduled increase in tax contribution is in accordance with the 1950 amendments to the social security law, and was enacted by Congress in anticipation of future obligations of the old-age and survivors insurance program.

Employees in jobs covered by the law will have 2.0 percent, instead of the present 1.5 percent, deducted from their pay checks beginning with the first of January up to earnings of $3,600 a year. Employers will contribute an equal amount. The new rates apply to all taxable wages paid after December 31, 1953, regardless of when earned.

In addition, the social security tax for self-employed is scheduled to increase from the present 2.25 percent to 3.0 percent for the period commencing January 1, 1954. Since the self-employed whose work is covered by the law pay their tax just once yearly at the time of filing their federal income tax returns, they will pay the present 2.25 percent social security tax on their 1953 income that counts toward old-age and survivors insurance. This payment will be due not later than March 15, 1954. The first payment at the increased rate of 3.0 per cent will be due March 15, 1955, for the calendar year 1954.

• *Copper States Watch Import Figures*

The states in which copper mining is a major industry are keeping a watchful eye on copper statistics. They have seen what has happened to the domestic lead and zinc industry because of excessive imports of metals and ores.

In the first nine months of 1953, the imports of crude and refined copper (but not including scrap metal) totaled 553,793 tons. In the same period in 1952, the total was 419,681 tons. Such an increase gives reason for concern.

Imports of ore and matte increased from 76,522 in the first nine months of 1952 to 91,515 tons in the same months of 1953. The increase came primarily from Canada, Mexico, Chile and the Philippines.

Blister copper imports in the same period jumped from 116,621 tons in 1952 to 222,985 in 1953 with Chile and Northern Rhodesia accounting for the bulk of the increase. Imports of refined cathodes were only slightly higher, totaling 226,538 tons in the 1952 period compared to 239,383 tons in 1953. However, very significant is the fact that the imports from Canada during the first nine months of 1953 totaled 60,059 tons, compared to 20,934 tons in the like period in 1952. Material increases were also reported for Mexico and Peru.

These figures show which way the wind is blowing. Will it develop in intensity until it equals the tornado that crippled the domestic lead and zinc industries and caused them to rush to Washington for greater tariff protection? So far, the lead-zinc producers have only received expressions of sympathy—no action.

• *Foreign Purchases Create Difficulties*

The rumors of possible scandals in the purchase of Thailand tungsten indicate the difficulty of keeping track of the sources of foreign material. Apparently, some tungsten was purchased in the open market, then shipped to the United States under the higher prices of a GSA

Re-study of your ore-dressing problems may show that newer Cyanamid Reagents, alone or in combination with older reagents, can make a worthwhile contribution to better recovery, lower costs or both. You may benefit also by adding Heavy-Media Separation or the Dutch State Mines Cyclone Separator Processes.

Cyanamid Field Engineers stand ready to work with you in developing a better flow scheme or reagent combination. They bring you experience gained through similar work with mines throughout the world . . . plus the latest findings of Cyanamid Mineral Dressing Laboratory.

And to serve your everyday needs for metallurgical chemicals, Cyanamid maintains nearby stocks of Cyanide, Flotation Reagents and auxiliary metallurgical chemicals. Orders may be placed with our New York Office or with American Cyanamid Company at 1440 Broadway, Oakland 12, Calif.; El Paso, Texas; c/o Weicker Transfer & Storage Co., Denver, Col.; or c/o Goodwin & Mayflower Moving & Storage Co., Spokane, Wash.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

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contract, instead of shipping only tungsten produced from the individual mine. In the long run, the same amount of tungsten would be purchased for the stockpile, so the United States is not really cheated. However, if this shenanigan was actually pulled, someone no doubt made a quick profit.

One is reminded of the reports during World War II. At that time it was alleged that Turkey sold us a pile of chrome, then moved it to a new location and sold it all over again. It just goes to show that purchases in foreign countries are very hard to control.

• *Domestic Resources Should Be Utilized*

In an address before the Chemical Economic Conference in Washington, D. C., Assistant Secretary of Interior Felix Wormser stated that greater emphasis must be placed on the utilization of domestic mineral resources.

"We cannot anticipate with assurance that our mineral needs that are not now being produced at home will always be available from foreign sources," he said. "Political instability, import and export restrictions, foreign exchange manipulation, heavy taxation, the constant threat of nationalization and monopolistic cartel practices are threats to adequate foreign supplies at fair prices."

Wormser also commented that this country's ability to expand mineral output has been retarded during the past 20 years by national policies which have discouraged the investment of capital in the exploration and development of mineral resources. Ways and means to correct the situation are being sought by the recently created cabinet committee, he said.

• *Administrator Mitchell of SBA Resigns*

William D. Mitchell, head of the Small Business Administration, has resigned. He was the first head of the new lending agency set up by Congress to replace the Reconstruction Finance Corporation and the Small Defense Plants Administration. Wendell B. Barnes is now serving as acting administrator.

When the SBA act was before Congress, an attempt was made by Senator Goldwater of Arizona and Representative Pfost of Idaho to amend the act to specifically mention mining in the definition of business eligible for assistance. Although this attempt failed, the conference report on S. 1030 (which authorized SBA) contained the following statement: "It is the unanimous opinion of the conferees that a producer of strategic and critical minerals and metals is as eligible for assistance under Title II as any other business concern if it meets the criteria for a small business concern under the act."

COMING CONVENTIONS

January 11, 12, and 13th, 1954. Annual MINNESOTA SYMPOSIUM ON MINING, Duluth, Minnesota.

January 26 and 27, 1954. SCINTILLATION COUNTER SYMPOSIUM, Statler Hotel, Washington, D. C.

January 28, 29, and 30, 1954. Annual meeting of the COLORADO MINING ASSOCIATION. Shirley Savoy Hotel, Denver, Colorado.

February 15 through 18, 1954. Annual Meeting AMERICAN INSTITUTE OF MINING ENGINEERS, mining branch at Statler Hotel and metals branch at Hotel McAlpin, New York, New York.

April 29, 30 and May 1, 1954. PACIFIC NORTHWEST METALS AND MINERAL CONFERENCE, Multnomah Hotel, Portland, Oregon.

SWITCH TO GM DIESEL

Ingersoll-Rand Gyro-Flo 600, driven by GM 6-71 Diesel, powers two wagon drills in New Jersey quarry.

FOR PORTABLE AIR POWER AT LOWER COST

CONTRACTORS, utilities, mine and quarry operators who have switched to General Motors Diesel-powered Gyro-Flo compressors unanimously report they get *"more work done faster at lower cost!"*

Basic reason is that this modern rotary compressor takes full advantage of GM Diesel's higher-speed 2-cycle operation. Because it delivers power at *every* downstroke of every piston, not every *other* downstroke as do 4-cycle Diesels, the GM Diesel produces a smoother, steadier flow of power. And this means full-rated delivery of even-flowing, non-pulsating cooler air at 100 psi and better.

The GM Diesel starts quickly in any weather and maintains its rated power well at high altitudes. Two-cycle design makes it smaller and lighter for its power. This permits lighter, more compact equipment with all the advantages of greater mobility.

Add to these features interchangeability of low-cost parts, plus world-wide General Motors Diesel service facilities, and you have reasons why it pays to standardize on GM Diesel power in all your equipment. Available today in all four sizes of Ingersoll-Rand Gyro-Flo compressors—105, 210, 315 and 600 cfm—and in more than 750 models of other equipment built by over 150 different manufacturers. *Save money—specify GM Diesel!*

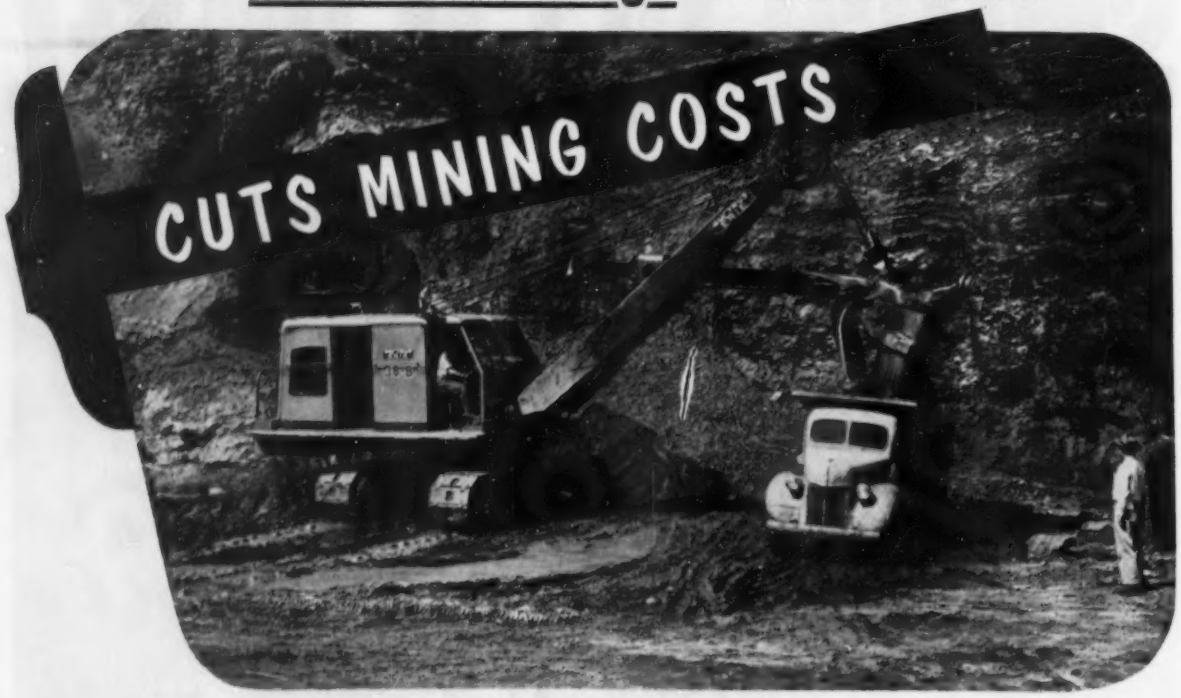
Single Engines ... 16 to 275 H.P. Multiple Units ... Up to 840 H.P.

GM GENERAL MOTORS DIESEL POWER

DETROIT DIESEL
ENGINE DIVISION

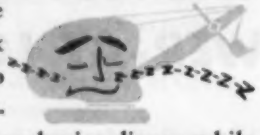
GENERAL MOTORS · DETROIT 28, MICHIGAN

How Individual Design In Excavators



A "line" of excavators **can** be built from a few basic models. Add some counterweight, speed up the engine, boost the dipper size — and one model becomes a larger size. It **can** be done . . . but **you** pay when it is. Here's what usually happens . . .

Some Excavators Will Be "Gold-Brickers" . . .



like this one. It will work fast and easy and no wonder! It's so over-powered it can fill its undersize dipper while loafing. But you are paying for power you can't use, twice over — in both higher initial cost and increased operating cost.

Some Others Are Weaklings

. . . such as this. The oversize dipper puts damaging stress and strain on every part. Every load it lifts speeds it on its way to the unhappy end of a shorter life. You'll be replacing parts often, taking it out of service for maintenance — and wasting production time.

Bucyrus-Erie Offers You Individual Design . . .

each model is built individually from crawler treads to boom point. Every part is properly proportioned and coordinated for maximum efficiency at its rated capacity. No parts are interchangeable with other models. All are matched for top performance.

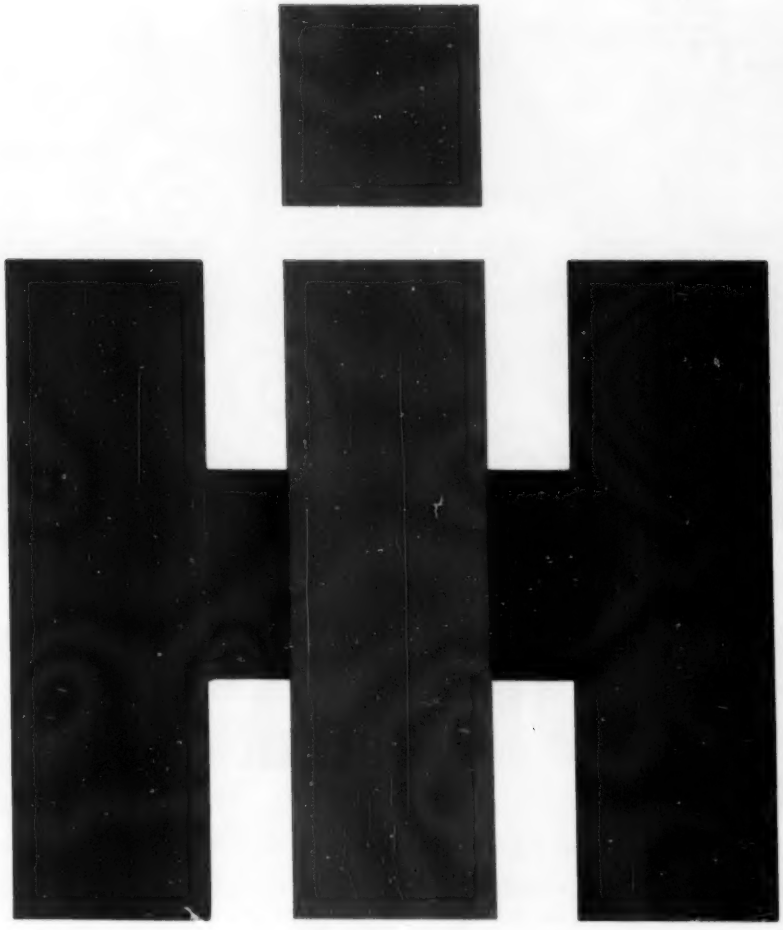
What Individual Design Means to You . . .

Individual Design means big loads, fast digging cycles, more output every shift . . . **without** excessive operating costs. Your Bucyrus-Erie distributor has the complete story. Let him explain further what Individual Design can mean to you specifically on your own mining jobs. 38E53

Bucyrus-Erie excavators are available from ⅜- to 4-cu. yd. gasoline, diesel, and single-motor electric shovels, draglines, cranes, clamshells, dragshovels (no 4-yd. dragshovel).

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

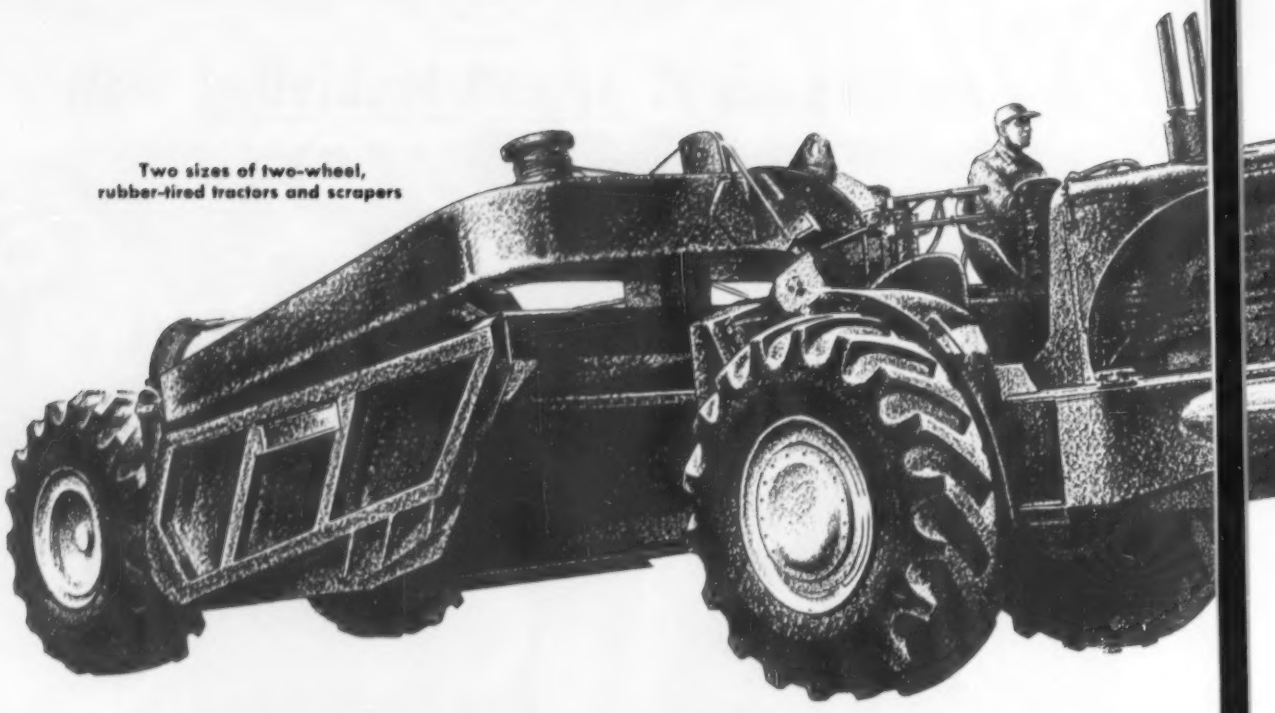


International Harvester and INTERNATIONAL Industrial Distributors present a complete line of modern earthmoving equipment, led by the INTERNATIONAL two-wheel, rubber-tired tractors with scrapers, and by "Big Red," the INTERNATIONAL TD-24, world's most powerful crawler

INTERNATIONAL HARVESTER

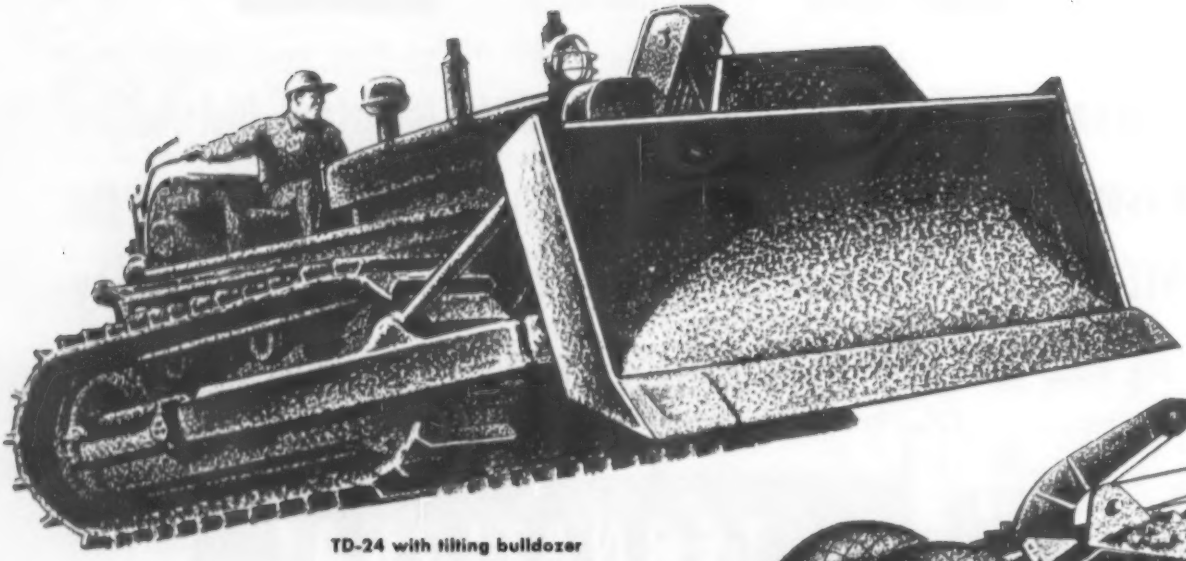
INTERNATIONAL

POWER TO MOVE THE EARTH

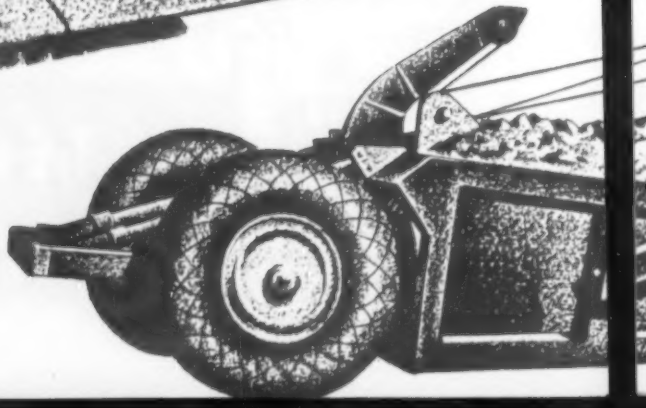


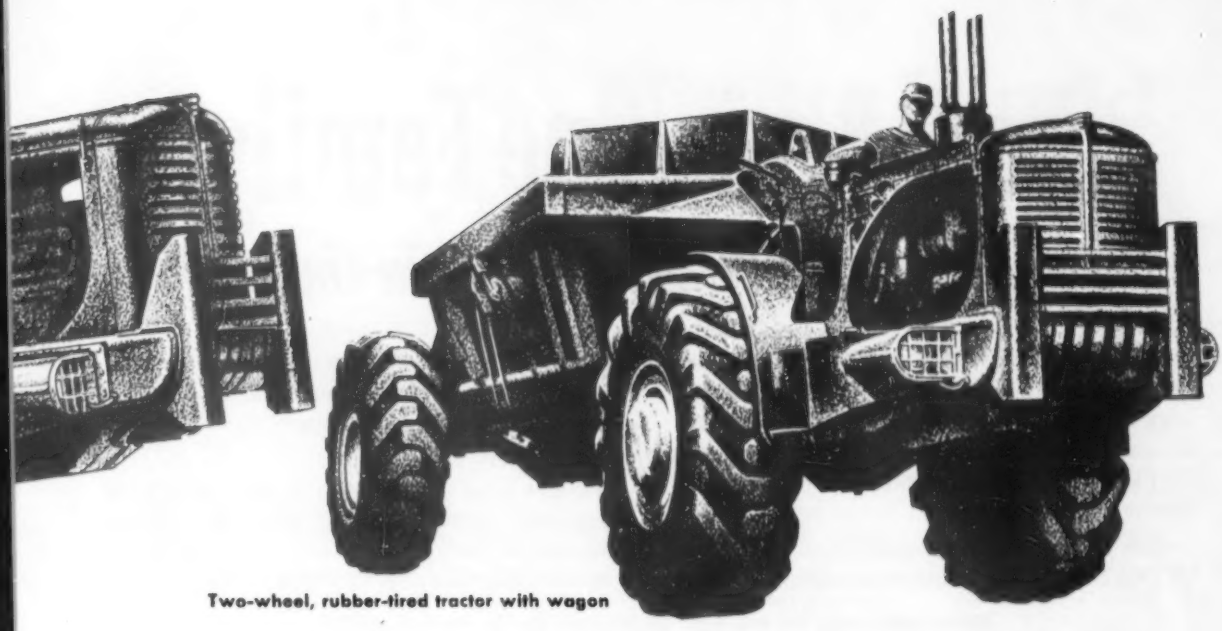
Two sizes of two-wheel, rubber-tired tractors and scrapers

Now a complete earthmoving line that comes in the



TD-24 with tilting bulldozer





Two-wheel, rubber-tired tractor with wagon

Big Red Package

Got a big job to do? Call on INTERNATIONAL'S new Big Red Team!

- Seven rugged crawlers headed by the TD-24—most powerful crawler on the market!
- Twenty-two matching hydraulic and cable-controlled bulldozers and bullgraders, with land-clearing blades available!
- Four 4-wheeled scrapers!
- Two high-speed, two-wheel, rubber-tired tractors with scrapers (13 and 18 heaped-yard capacity)!
- A high-speed, two-wheel, rubber-tired tractor with bottom dump wagon (20 heaped-yard capacity)!

These great machines, now grouped under the INTERNATIONAL banner, have proved their dependability and economy to contractors for years on big projects around the world.

Your INTERNATIONAL Industrial Distributor has the equipment that will help you make a profit on any job you tackle. Call him for full details . . . or for actual demonstrations. See for yourself!

POWER THAT PAYS

INTERNATIONAL HARVESTER

INTERNATIONAL

TD-24 crawler with matched scrapers

Now All in One Family

the hardest-working work teams in the world!

The new INTERNATIONAL team stars not only a full line of rugged red INTERNATIONAL crawlers, complete with INTERNATIONAL scrapers and bulldozers, but also high-speed INTERNATIONAL two-wheel, rubber-tired tractors with scrapers.

This means that now, more than ever, your INTERNATIONAL Industrial Distributor is "Earthmoving Headquarters" for your area. He offers you IH equipment to tackle any job, backed up by unsurpassed service facilities and parts supplies.

He's at your call, always, to help keep your equipment rolling . . . to cut down your down-time and pile up your profit-time . . . to serve you with INTERNATIONAL "Power that Pays!"

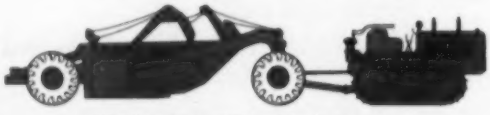
INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

INTERNATIONAL HARVESTER

INTERNATIONAL

POWER THAT PAYS

TD-24 crawler with matched scrapers



TD-18A crawler with matched scrapers

TD-24 crawler with bullgrader

TD-14A crawler with cable bullgrader

TD-9 crawler with hydraulic bulldozer

T-9 crawler with hydraulic bullgrader

TD-6 crawler with hydraulic bulldozer

T-6 crawler with hydraulic bullgrader

Model 2T-75 two-wheel, rubber-tired tractor with 18 heaped-yard capacity scraper

Model 2T-75 two-wheel, rubber-tired tractor with 20 heaped-yard capacity bottom dump wagon

Model 2T-55 two-wheel, rubber-tired tractor with 13 heaped-yard capacity scraper

Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

January, 1954

INTERNATIONAL PANORAMA

BRUSSELS, BELGIUM—The Societe Generale des Minerais has started exploration drilling for lead-zinc ore at the Bleiberg and Moresnet mines.

SAN FELIPE, LOWER CALIFORNIA, MEXICO—The Texas International Sulphur Company will build an autoclave plant here to refine sulphur from its open-pit Navarro mines.

MOSCOW, USRR—Production of aluminum is expected to increase to 455,000 annual tons in 1955 compared with estimated production of 300,000 tons in 1953.

MINERAL, VIRGINIA—The New Jersey Zinc Company plans to start underground exploration at its Arminius zinc mine here following favorable surface diamond drilling.

TOLEDO, PHILIPPINE ISLANDS—Shipment of copper concentrate from the 4,000-ton-per-day flotation mill of the Atlas Consolidated Mining and Development Corporation to the Japanese firm, Mitsubishi Metal Mining Company, Ltd., is scheduled for mid-1954.

CEDAR CITY, UTAH—The Colorado Fuel and Iron Corporation is developing a new open-pit iron mine east of Iron Mountain. The mine will be called the Comstock and has been explored by diamond drilling since 1945.

JOS, NIGERIA—The Gold & Base Metal Mines of Nigeria Ltd. has signed a contract with the United States government to expand columbite production. Output will be sold to the United States through 1956 at a guaranteed price.

MONTICELLO, UTAH—The United States Atomic Energy Commission will spend $1,000,000 for enlargement and improvement of its uranium-vanadium mill here. Sulphuric acid leaching will be instituted in place of caustic soda leaching.

GARDEN ISLAND BAY, LOUISIANA—Freeport Sulphur Company has started sulphur production at its new mine here. The plant cost $14,000,000, is the largest sulphur mine development in world since 1933, and will produce 500,000 long tons annually.

BARTOW, FLORIDA—Armour Fertilizer Works is building a new phosphate washing and flotation plant here. Estimated cost is $7,000,000 with first production scheduled in 1955.

WASHINGTON—High government officials have declared the United States to be "woefully weak" in production of titanium for airplane construction in testimony before the United States Senate's Malone sub-committee on strategic minerals.

MARQUETTE, MICHIGAN—Iron ore shipments in 1953 from this port were 5,135,796 tons. In 1952 because of the steel strike only 4,139,245 tons were shipped.

KUALA LUMPUR, MALAYA—Perak governmental authorities have granted permission for the first post-war tin prospecting in Malaya. Ulu Klang Tin Ltd. and Anglo Malayan Development Ltd. have established an armed headquarters camp and will prospect the Sungi Manik district of South Perak.

HOLDEN, WASHINGTON—The Howe Sound Company has signed a contract to mine and deliver 18,700,000 pounds of copper to the federal government through 1955 at a price of 31.50 cents per pound. Ore will be mined at Holden and smelted at a "qualified" smelter.

GRAND JUNCTION, COLORADO—Colorado Plateau uranium producers have been paid $2,535,000 in bonuses since March 1, 1953. Bonuses are paid for the first 10,000 pounds of U_3O_8 mined from a new mine.

KILEMBE, UGANDA—Frobisher Mining Company has agreed to advance a second $5,600,000 to bring the Kilembe copper-cobalt mine into production. The Colonial Development Corporation and the Uganda Development Corporation are also assisting in the financing.

MARRAKECH, FRENCH MOROCCO—The new aerial tram to transport manganese ore from the south side of the Atlas Mountains to the north side has been placed in operation. Capacity is 50 metric tons per hour.

MOSCOW, USRR—The seventh aluminum plant in Russia is now under construction. It is in Armenia and reportedly will have an annual capacity of 83,000 metric tons.

TOKYO, JAPAN—Production of titanium is scheduled for 1,330 tons in the next fiscal year compared to 160 tons in 1953 fiscal year. Two of the six Japanese producers are enlarging plants.

Syndicate Reopens Rich Rhodesian Nickel Mine

The Noel nickel mine in Southern Rhodesia is being reopened after 18 years by the Gwanda Nickel Syndicate.

Located in the Lower Gwanda serpentine belt on Shashani Ranch, it was last worked on a small scale from 1935 to 1939, when a total of 3,261 long tons of high-grade (45 percent or more nickel) hand-cobbed ore was produced. At that time the ore was shipped to France.

Shortly before World War II, the property was acquired by Japanese interests, and the construction of a concentrating mill was started. However, the outbreak of war brought this to a close. The claims were subsequently forfeited, and then recently acquired by Gwanda Nickel Syndicate.

The ore consists of niccolite (NiAs) and chloanthite [(NiCo) As_{2-x}]. The ore bodies are narrow discontinuous veins, presumably in "en echelon" arrangement, consisting of almost pure sulphides.

ASARCO Completes New Colorado Flotation Mill

Final construction of the new 200-ton-per day differential flotation lead-zinc mill at the Keystone mine near Crested Butte, Colorado has been completed. The American Smelting and Refining Company has been building the mill and related facilities under contract to Western-Knapp Engineering Company since early June 1953. In addition to the mill, a warehouse, machine shop-compressor building, garage, and snow sheds were built.

Hudson Bay Co. Works On New Copper Development

Hudson Bay Mining & Smelting Co., Ltd. of Canada has announced the development of a new copper mine in Saskatchewan, about 13 miles southwest of Flin Flon, Manitoba, where the company has a smelter and other operations. The deposit consists of two parallel ore bodies separated by about 200 feet of lower-grade material.

The north ore body, as estimated to date, contains 70,000 tons of 10.0 percent copper ore to a depth of 400 feet which indicates a gross tonnage of 7,000 tons of copper. The south ore body is estimated by drilling to date to contain 180,000 tons of 40 percent copper ore, also to a depth of 400 feet, or a gross copper content of 7,200 tons. Both ore bodies are estimated to contain about $2.50 in gold per ton of ore.

Drilling below the 400 foot depth will continue and, according to a company spokesman, "there is good reason to expect both will continue to a greater depth."

Mill of the Getchell Mine, Inc. near Red House, Nevada was originally a 1,500-ton-per-day conventional sand-slime cyanide plant for gold ore. It was later expanded with a flotation section for sulphide gold ores. When the United States government needed tungsten the mill was converted to concentrate scheelite.

How Getchell Gold Mill Recovers Tungsten

Getchell Mine, Inc., long a prominent Nevada gold producer, converted its 1,500-ton-per-day cyanide plant to treatment of tungsten (scheelite) ores in one week following outbreak of Korean War. This conversion was simplified by the fact that Getchell used flotation for sulphide concentration in the gold circuit and the same machines are now floating scheelite. Later, an acid leach plant was built to upgrade flotation concentrate to government specifications.

Conversion to tungsten milling was dictated by the Korean War which sky rocketed defense requirements for tungsten while at the same time exports of Chinese tungsten were stopped. Expansion of domestic production was needed to meet demand.

The United States government instituted at this time a tungsten purchase program of guaranteed price that successfully increased domestic production from three sources: expansion of production by established suppliers; development of new mines and construction of new mills; and the conversion of existing mills to tungsten concentration. The Getchell mill, formerly a gold producer, is an excellent example of the last mentioned source of new tungsten production.

Gold To Tungsten Change

The Getchell mill, owned and operated by Getchell Mine, Inc., is near Red House in northern Nevada. It was a 1,500-ton-per-day, typical cyanide plant with sulphide flotation circuits until its conversion to tungsten production.

Scheelite ores had been identified in a wide area surrounding the mill site and workable deposits, both open pit and underground, had been outlined on property held by the company. In late 1950, gold operations were suspended and the applicable sections of the mill—crushing, grinding, and flotation—were converted to handle these scheelite ores. Conversion was completed in one week with only minor changes in the existing circuits and equipment. To completely integrate the operation for the production of a concentrate grade acceptable to the government, the gold refinery was later converted to an acid treatment plant to remove impurities inherent in the tungsten ores of the district.

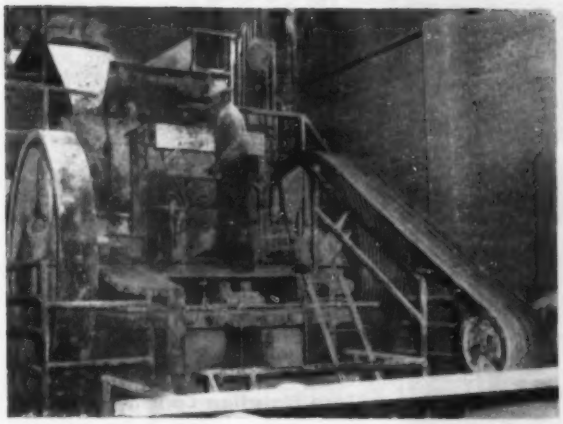
To realize the full importance of a final treatment plant in connection with a scheelite concentrator, it is well to review the requirements set by the government on acceptable grades of tungsten concentrates. In Table No. 1 are listed the specifications and penalties that must be met by the various types of tungsten ores. Most, if not all, tungsten ores contain varying amounts of minerals bearing one or more of these penalty metals. More important, many of these minerals are not only difficult to remove in flotation circuits but are actually concentrated in many cases to above penalty percentages along with the tungsten. Though gravity methods are sometimes effective in preventing this concentration, recoveries are commonly so low on the usual low-grade ores that losses become prohibitive.

A second alternative for the tungsten producer is to sell his concentrates to one of the two existing domestic custom treatment plants that are equipped to chemically remove penalizable impurities.

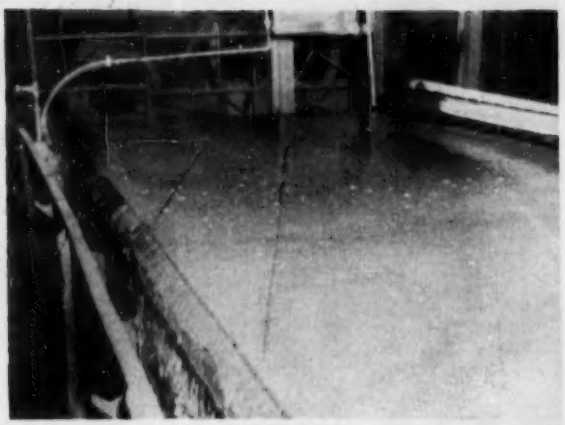
Importance Of Ore Testing

Due to the wide variance in the characteristics of tungsten ores in different localities, milling and treatment procedures that successfully concentrate one type of ore may prove wholly inadequate on another. For this reason, any particular milling method proved successful elsewhere should first be thoroughly tested in the Laboratory before being tried on a commercial scale with a new ore. In cautioning against precipitate conversion to Getchell's methods, mill superintendent Keith Kunze points out, "The practice at the Getchell Mill, which is successful in treating a variety of ores within a 200 mile radius in Humboldt County in northern Nevada, is not necessarily adaptable to all scheelite ores."

Five mines operated by Getchell under the direction of general superintendent Royce A. Hardy and consulting engineer Roy A. Hardy, supply over 75 percent of the mill heads, now averaging 800 tons per



The primary crusher for company-account ore is a 42- by 48-inch Traylor jaw. A separate smaller unit is used to crush custom ore at the Getchell mill.



Deister SuperDuty diagonal deck tables are included in the tailing and concentrate circuits in the flotation as a visual check on plant efficiency.

day, with the balance being custom ore.

Contact Metamorphic Minerals

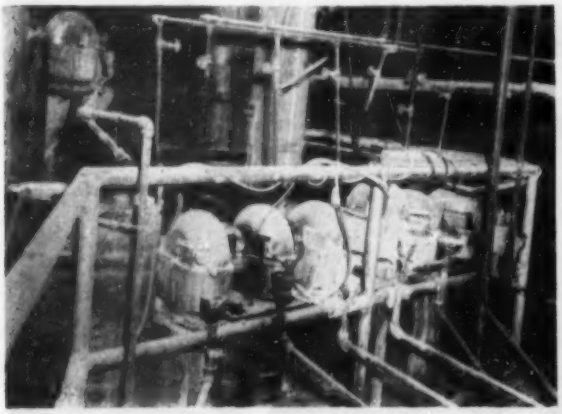
To insure a steady supply of company-account ore, Getchell has carried on extensive development and exploration programs at five producing properties. Ores in the area occur generally as tungsten-bearing tactites from contact metamorphic deposits. Among the identifiable minerals are scheelite [$CaWO_4$], powellite [$Ca(Mo,WO_4)$], apatite [$Ca_5(PO_4)_3Cl{\cdot}F$], garnet, epidote [$Ca_2(AlOH)Al_2(SiO_4)_3$], calcite [$CaCO_3$], pyrite [FeS_2], molybdenite [MoS_2], quartz [SiO_2], and graphite [C]. Of these, probably only the molybdenite and apatite prevent the concentrate from reaching acceptable grade in a conventional milling circuit. The other minerals are contained in relatively minor amounts. All sulphides and phosphorus, however, are concentrated with the tungsten minerals and must be removed, at least partially, by further processing to meet government requirements (see Table No. I).

Truck haulage of the ore produced from Getchell mines is done in 15-ton, tandem dual, rear-dump Kenworth trucks powered with Cummins Diesel engines.

Two separate primary crushers are provided at the mill, a 42- by 48-inch Traylor jaw crusher for the company ore and a smaller unit that handles custom ore before secondary crushing. In this way, sampling and testing material from various shippers is facilitated and mill circuits can be more closely controlled for maximum efficiency as mill feed varies.

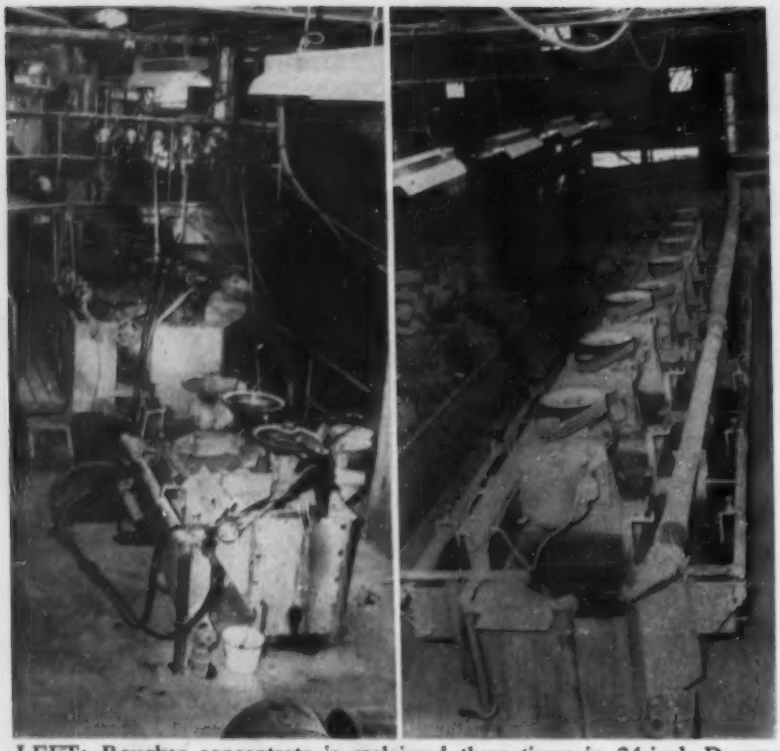
Minimize Overgrinding

One of the most important factors affecting recovery is the degree to which flotation feed is ground. Even slight overgrinding lowers the percent of recovery to a marked degree. Optimum grind is achieved by a combination of an 8- by 12-foot rod mill in open circuit followed by a 8- by 6-foot ball mill in closed circuit with a classifier. Classifier overflow is maintained at a pulp density of 53 percent solids. Tailing analysis shows that over 20 percent of the tungsten carried in the waste is contained in the minus-100-mesh, plus-200-mesh particle size and nearly 70 percent in the minus-200-



The amount of reagents fed to flotation varies widely because of different ores treated yet must be carefully controlled to insure optimum recovery.

Getchell's acid leaching plant for the removal of phosphorus, calcite, and sulphides from concentrate is under the direction of foreman Pete MacKelvice.



LEFT: Rougher concentrate is reclaimed three times in 24-inch Denver "Sub-A" flotation cells. RIGHT: Booth and Fagergren flotation cells are used in the rougher circuit.

mesh fraction. Since only relatively small amounts of these fractions can be economically recovered in normal flotation operation, it is important they be kept at a minimum in the pulped ore.

After classification, pulp is fed to four conditioning tanks where it is agitated for 30 minutes before transfer to the rougher flotation section.

No sulphide flotation circuit is included in the Getchell mill flowsheet; a flotation step in the final acid treatment plant effectively removes the sulphide minerals. The rougher circuit, where the pH is maintained between 10.2 and 10.4 and pulp density is 27 percent solids, is made up of four 66-inch Booth flotation cells and the concentrate from these is cleaned three times in No. 18 cell.

The scavenger circuit consists of four 66-inch Fagergren cells, three 56-inch Fagergrens, and five 56-inch Booth cells.

Reagents And Uses

Final flotation concentrate, is stored in a 44-foot thickener to await treatment in the acid leaching plant. Optimum recovery is generally achieved with 30 to 40 percent WO_3 concentrate.

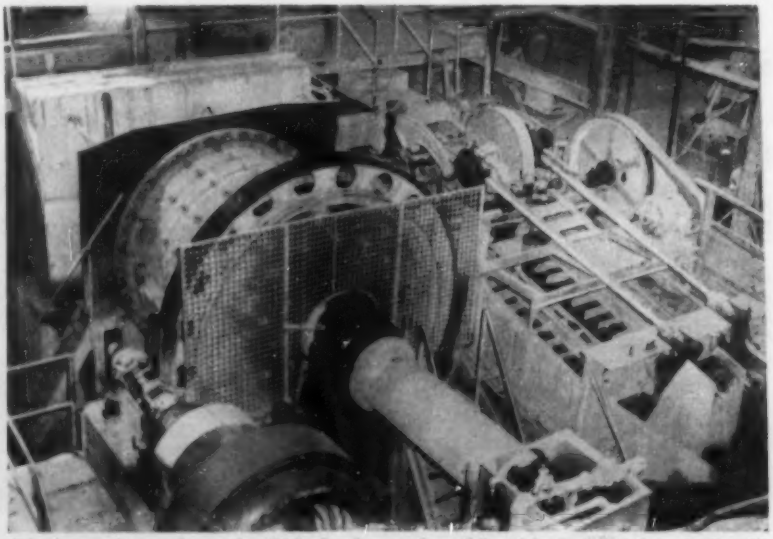
To effect conditioning for flotation, soda ash, quebracho, and sodium silicate are added in the rod mill; oleic acid is added to the classifier overflow; and D-40 (detergent) is added at the head of the flotation circuit. The addition of the modifiers and gangue depressants to the rod mill pulp affords maximum conditioning time to insure a high-grade flotation product. Additional amounts of oleic acid and D-40 are stage fed to the cells and sodium silicate, quebracho, and D-40 are added as needed in a 4- by 4-foot conditioner ahead of the final cleaner circuit.

A Deister Super Duty diagonal deck shaking table has been added in the final concentrate circuit and a laboratory pilot table in the tailing circuit to enable operators to visually check the mill operation. A second rapid visual check on flotation efficiency is the condition of the froth.

Close Flotation Control

To insure minimum recovery in the concentrate of the undesirable gangue minerals, the condition of the froth must be very closely controlled. Even very minor excesses of oleic acid, for instance, produce a thick, sticky froth that markedly lowers concentrate grade. Optimum froth condition, however, must be worked out for each individual operation because so many factors affect it—and, consequently, affect the quality of the concentrate.

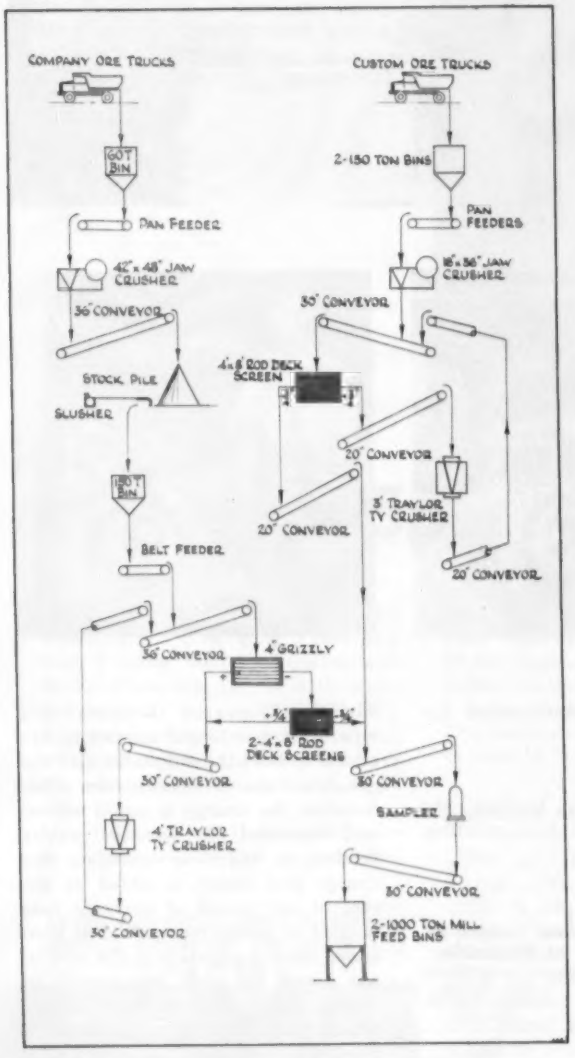
Because of the continually changing pulp characteristics resulting from the variety of ores received at the Getchell mill, the amounts of reagents required to maintain optimum concentrating efficiency often change several hundred percent during a single shift. Much of the millmen's time, therefore, is spent in watching the froth and the tables and in devising reagent combinations that will effectively control changing conditions.



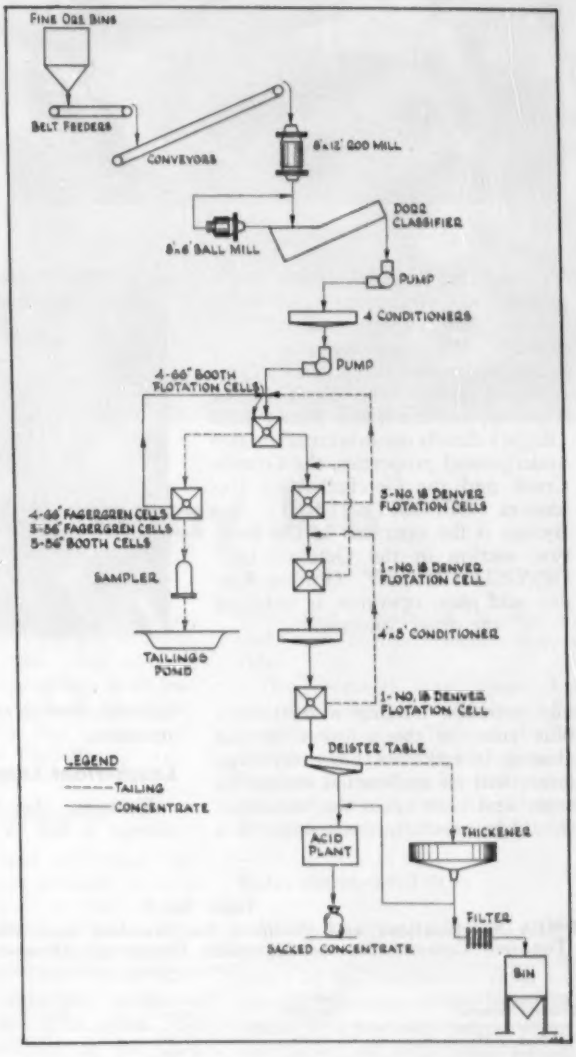
Discharge from the rod mill is further reduced by this 8- by 6-foot ball mill operating in closed circuit with a rake classifier.

FLOWSHEETS OF THE GETCHELL MILL

Crushing



Milling



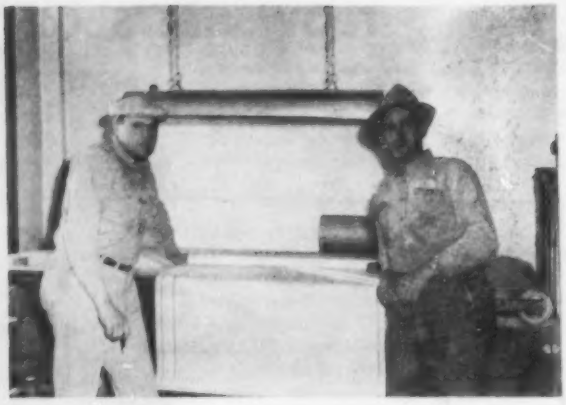
Another important factor that adversely affects recovery is the amount of soluble salts in the ore or in the mill make-up water. Reaction between oleic acid and soluble salts forms metal oleates that cause high tailing losses. Increasing the amount of soda ash fed to the grinding circuit will often correct this condition and in some ores as much as 18 pounds per dry ton of feed must be added.

Two-Stage Leaching

As in some other plants where hydrochloric acid is used to digest the gangue minerals from the concentrate, the Getchell mill employs a two-cycle leaching process. The first leach removes calcite and the second removes phosphorus.

In the first step, two to three tons of concentrate are charged to each of three 6- by 8-foot agitator tanks and the charge is settled and decanted. 20° Baume acid is then added to the concentrate until the violent effervescence accompanying the solution of the calcite stops.

In spite of the heat generated, the presence of calcium chloride acts as an effective buffer against the solution of scheelite during the reaction. The second leach is necessary because this same buffer action prevents the solution of phosphorus. Before the second cycle, the calcium chloride solution is decanted and fresh acid is added. Controlling the strength of the acid and time of contact now becomes of utmost importance since the protection against the solution of scheelite has been removed. If the leach is carried out in wood tanks or in the presence of reducing agents—carbon or organic matter—the dissolved scheelite rap-



TOP LEFT: Royce A. Hardy (left), general superintendent, and Keith Kunze, mill superintendent. TOP RIGHT: William J. Newman (left) is superintendent of Getchell's three open-pit mines—the Pacific, The Tip Top, and the Kirby. Elmer Snell (Right) directs operations at the two underground properties, the Granite Creek and the Getchell-Riley Extension. OPPOSITE LEFT: Jim Byrnes is the operator of the flotation section in the Getchell mill. OPPOSITE RIGHT: Gordon Kinney acid plant operator, is weighing the dried concentrate.

idly reduces, lending a distinctive blue color to the solution. In the absence of reducers, however, large losses will go undetected except by assay and here again the technique should be carefully worked out in a laboratory before commercial application.

Leach-Float-Leach

Between the two leaches, the charge is fed to an acid-resisting, 36-inch Fagergren flotation cell where Frother 77 and quebracho are added to float the sulphides and the graphite from the concentrate. After flotation the charge is again settled and decanted. A specific gravity reading is taken to calculate the charge and water is added at the rate of one pound of water to four pounds of concentrate. Acid is then added during agitation at the rate of one pound for each two pounds of charge. After one-half hour of agitation, the leached concentrate is filtered in a 42-inch Shriver washing filter-press, from which the solution is blown, and then water-washed for one-half hour. Final concentrate is removed from the filter press, dried on electric driers, and bagged in 100-pound sacks for shipment. Each bag of concentrate assays roughly 66.0 percent WO_3 and 7.5 percent insolubles. The insolubles contained in the concentrate are not removed during leaching, but are concentrated with the scheelite. A relatively low insoluble content is, therefore, important in producing a high grade final concentrate.

Table No. 1

DMPA Specifications and Penalties for Standard and Minimum Grades of Tungsten Concentrates and Maximum Percentage Allowances of Impurities

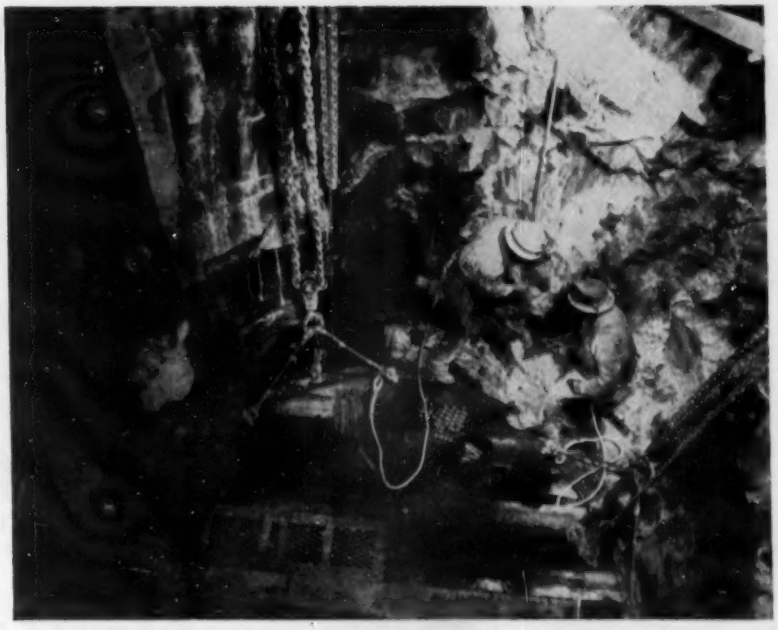
Percentage of Tungsten Trioxide Required	*Ferberite (percent)*	*Huebnerite (percent)*	*Wolframite (percent)*	*Scheelite and Artificial Scheelite (percent)*
Standard Grade	60.00	60.00	65.00	60.00
Minimum Grade	55.00	55.00	60.00	55.00
Impurities				
Tin	0.20	0.25	1.50	0.10
Copper	0.10	0.10	0.05	0.05
Arsenic	0.15	0.10	0.25	0.10
Antimony	0.10	0.10	0.10	0.10
Molybdenum	0.40	0.40	0.40	0.40*
Phosphorus	0.07	0.05	0.05	0.05
Sulphur	0.50	0.50	0.50	0.50
Manganese	1.00	**	**	1.00
Lead	0.20	0.20	0.20	0.10
Zinc	0.10	0.10	0.10	0.10

Penalties:

1. Deduct twenty cents ($0.20) per each short ton unit for each 1.0 percent of WO_3 below standard requirements (60 percent). No concentrate accepted below minimum (55 percent).
2. For each short ton unit of WO_3 a deduction of twenty-five cents ($0.25) will be made for each of the following percentage increments in excess of maximum allowances as to each of the following elements:

0.01 Copper (Cu)	0.10 Tin (Sn)
0.01 Phosphorus (P)	0.10 Sulphur (S)
0.10 Arsenic (As)	0.10 Antimony (Sb)
0.50 Bismuth (Bi)	1.00 Manganese (Mn)
0.10 Molybdenum (Mo)	0.10 Lead (Pb)

* Amended to 2.75 percent in December 1951.
** Not specified.



Suspended circular platform holds these two miners while they load a slab round. The platform is also used during concreting operations.

Bulkhead Speeds Airway Job

A chain-suspended platform for widening and concreting a new airway is being used by International Nickel Company, Inc. at its Creighton Mine at Copper Cliff, Ontario. The 600-foot ventilation raise is part of a plan to bring the lower levels of the mine into full-scale ore production.

Initially, a 7- by 11-foot pilot raise is driven in 200-foot sections between the 58, 60, 62, and 64 levels. Then working from the top down in 10-foot sections, the pilot raise is slabbed to the finished size of 13 feet 6 inches in diameter and concreted. The completed circular airway will be over 13 feet in diameter.

In this view the sectional steel forms used in concreting the airway are still in place.

Bulkhead Aids Operation

The slabbing and concreting operations are accomplished from a platform suspended on four sets of chains. Eye bolts driven into a finished section of the airway wall anchor the chains. The miners start the cycle by drilling and blasting a slab round in the pilot raise. The platform is raised during the blast and then lowered again to enable the men to scale down the loose rock. Holes are next drilled for the steel pins which support the cylindrical sectional steel forms for the concrete.

Push-Button Concrete

After the steel forms have been lowered, lined up, and blocked into place, hitch boxes for the steel manway dividers are set. The concrete flows by gravity from the mixing station located on the 56-level. The pour-pipe is carried down the vent-raise in the manway compartment as the airway progresses. A simple connection is made to the pour-pipe and "push-button" concrete is available.

The sectional steel forms have added greatly to the efficiency of the construction cycle. They can be lowered into position for each pour in a fraction of the time it would take to set up wooden forms. And they can be used over and over again.

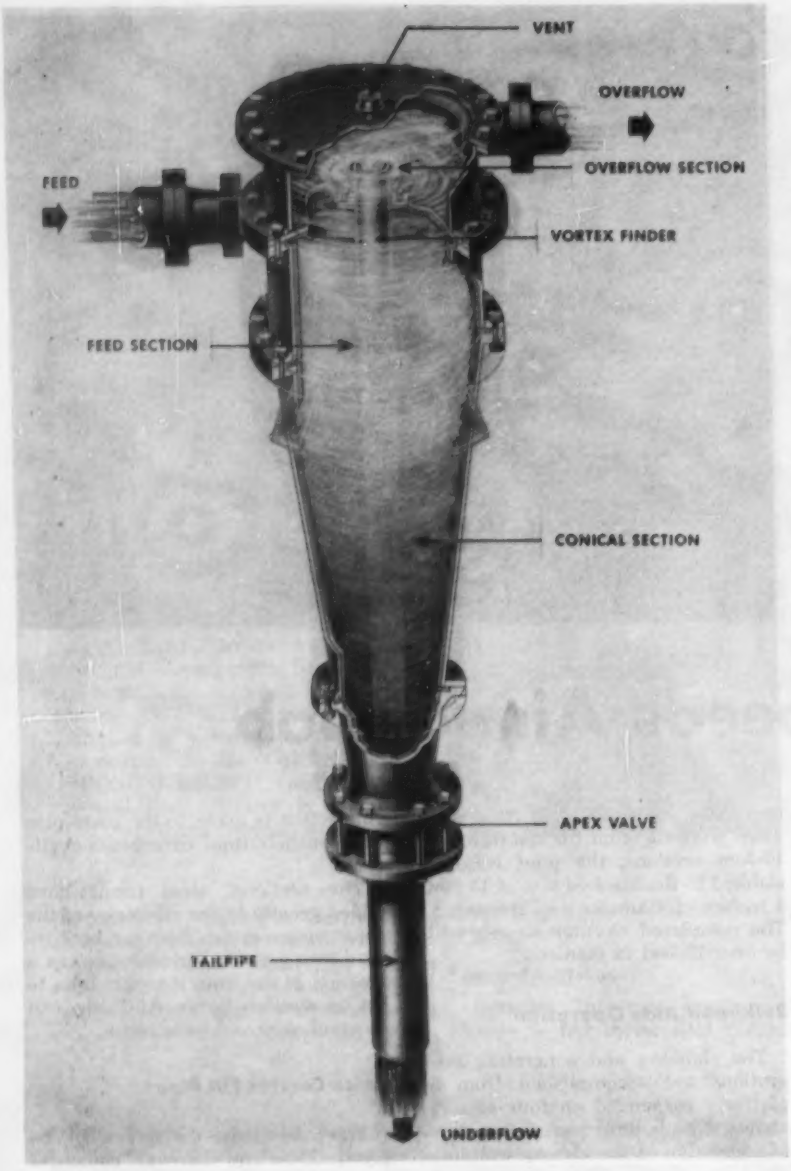
Raise Carries Fill Pipe

The sand fill for the stopes will be piped down the manway compartment of the ventilaiton raise when mining operations on the lower levels begin. The manway compartment is partitioned off with corrugated iron sheeting and will serve as a continuation of the mine's safety manway to the surface.

Will Carry 350,000 CFM

The new airway is designed to carry 350 000 cubic feet of air per minute to the lower levels. The main intake fan of the Creighton's elaborate ventilation system is located on the 40-level and the main exhaust fan is on the 30-level.

A concreted station will be located at each level. These stations will house the ventilation system controls for the airway.



Will Cyclones Replace Mechanical Classifiers?

- ***Yes, They already have in many secondary grinding circuits.***
- ***Yes, In many primary circuits when advantages become known.***

By M. J. Dennehy
Diamond Research Laboratory
Johannesburg, Union of South Africa

While much information has been available for several years concerning the use of cyclones for dewatering and fine classification, there has been a marked paucity of published data concerning cyclones in primary grinding circuits. First details of primary circuiting were reported in the Treatment Trends section, page 42, of the October 1953 issue of MINING WORLD.

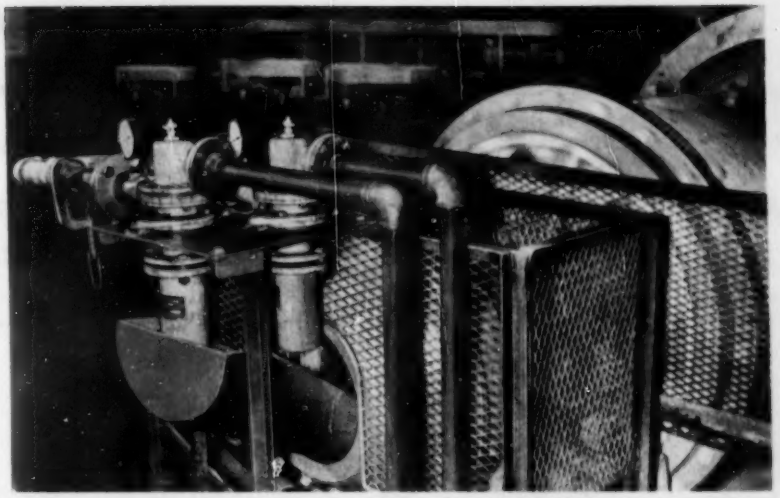
This report indicated such far-reaching possibilities for improvements in both primary and secondary grinding circuits at a substantial reduction in investment and operating costs that MINING WORLD asked Mr. Dennehy to answer the following questions regarding cyclones. What induced you to test cyclones in grinding circuits? What made you think of their use in primary circuits? What results have been obtained by their use? Mr. Dennehy has answered these questions and predicts a growing use for cyclones in this special report for MINING WORLD—Ed.

It is common knowledge that over a period of years, frequent but fragmentary references had been made to the Dutch State Mines cyclone in its various applications. Though patented in 1891 by Bretney, it was not until 1939 that much use was made of this simple and efficient machine. In that year, the State Mines of Limburg, Holland, applied it with considerable success to coal processing. To this enterprising and progressive company must be accorded full credit for putting the cyclone definitely on the map, metallurgically speaking. As a result, this machine is known throughout the world today as the Dutch State Mines cyclone.

Because of the success achieved in Holland, much greater publicity followed and many fields were discovered in which the cyclone could be used successfully, effectively, and economically. Successes were reported in many papers and articles throughout the mining and metallurgical world but, strangely enough, there was no reference whatever to its possible use in gold metallurgy. It remained in that field purely of academic interest. A possible explanation of this may be that the results being achieved through the use

of conventional classifiers were excellent and there appeared to be little room for improvements from the metallurgical aspect. On the economic side, the vast savings possible had apparently not as yet been realized.

It was in 1951 that it came to the writer's attention that a 3-inch cyclone was being tested with a view to the removal of abrasive solids from underground water before pumping to the surface. Details of this test need not be given here—suffice it to say that the results were not very satisfactory. At the time, particularly in United States and Canadian technical magazines, references appeared concerning the success which had been achieved in the preparation of a product suitable for underground fill from crushed ore.



These two 3-inch-diameter DorrClones are used as classifiers in the zinc-lead regrinding circuit of a 1,000-ton-per-day flotation mill in the United States.

First Test A Success

In 1951 it was decided to test the possibilities of the cyclone on a crushed ore with 72 percent minus-200-mesh product. Here immediate success was attained—a spigot product of roughly 50 percent of total ore crushed being obtained which settled rapidly and compactly. This was the first time the writer had viewed a cyclone in operation. While the test was being carried out, close watch was kept to determine the degree of wear, and attempts were made to determine the tonnage capacity. It became obvious at an early stage that, in relation to its size, the cyclone had a very high tonnage capacity indeed.

It will be realized that working with a 3-inch cyclone this was purely a laboratory operation. The results, as indicated were so promising, however, that it was decided to test it out on a working scale. A 14-inch by 20° cyclone* was made at the gold mill of the Rand Leases (Vogelstruisfontein) Gold Mining Company, Limited near Krugersdorp on the Central Rand in the Union of South Africa and put into use for the same purpose. It was found that through this small machine, a total of 800 tons of solids with a liquid-solids ratio of 1:1 could be handled and the desired separation achieved. While this work was being done, an intensive search of all available literature on cyclones and their performances was being conducted.

In a text book published in 1951 on mineral dressing†, the authors—J. V. N. Dorr and F. L. Bosqui—devoted a scant half-page to cyclones. But this significant assertion was made: that whereas the cyclone could not be expected to operate as a clarifier, it obviously had very great possibilities as a classifier. Thus the impression that had been gleaned from our experimental work was confirmed by two of the world's leading authorities. We had a clear-cut case to present in requesting additional funds to carry investigation work still further. After the briefest of discussions, consent was readily given and every assistance rendered to facilitate and hasten the work.

Benefitting from observed facts, a 24-inch 20° cyclone was made in sections and lined with Linatex rubber to counteract wear. The most intensive wear takes place in the spigot but the rate decreases very rapidly upwards from the spigot. In one case, where it was found necessary to renew the spigot after 42 full (24 hour) operating days, the two upper sections showed very little sign of wear; and still very little wear after 14 months. It will thus be seen that maintenance costs would be practically negligible when compared with those involved in the operation of a 20-foot Dorr bowl-classifier, which the cyclone was being called upon to replace.

Secondary Circuits

This 24-inch cyclone was installed in the secondary circuit which up to that time had been operated in closed circuit with 20-foot Dorr bowl-classifiers in the Rand Leases mill. The feed to the latter consisted of 1,800 tons of dry solids with approximately 35 to 40 percent minus-200-mesh, and the overflow sought was 700 tons of dry solids with 68 to 70 percent minus-200-mesh and an underflow return to the mill for further grinding of 1,100 to 1,200 tons with 11 to 12 percent minus-200-mesh and a water content of under 30 percent. These results had been achieved over a long period by the Dorr bowls and gave the maximum extraction at the lowest cost. This was the task set the cyclone. When it is realized that, apart from the negligible maintenance costs, the installed cost of the cyclone was $896.00 compared with $11,200.00 for a 20-foot Dorr bowl classifier, some idea of the possible savings will become evident.

After an experimental period, during which the cyclone was placed in various positions and fed by various means, it was decided to place the cyclone immediately above the ball mill at such an elevation that the overflow, constituting the final product suitable for cyanidation, would gravitate directly to the thickeners. This position was such that the cyclone could be fed by gravity, the feed head being approximately 12 feet, giving a feed pressure of 4½ to 5 pounds per square inch. In all the literature dealing with cyclone operation, the necessity for high feed pressure had been stressed. To achieve such feed pressures involved considerable alteration to the plant, as well as the cost of additional pumps. Were it found that the cyclone could be operated at low feed pressures, all the additional expenditure would be avoided. The work at Rand Leases showed that once the

* Combined angle of apex—Ed.

† Dorr, J. V. N. and Bosqui, F. L., *Cyanidation and Concentration of Gold and Silver Ores*, Second Edition, 1951, McGraw-Hill Book Company.

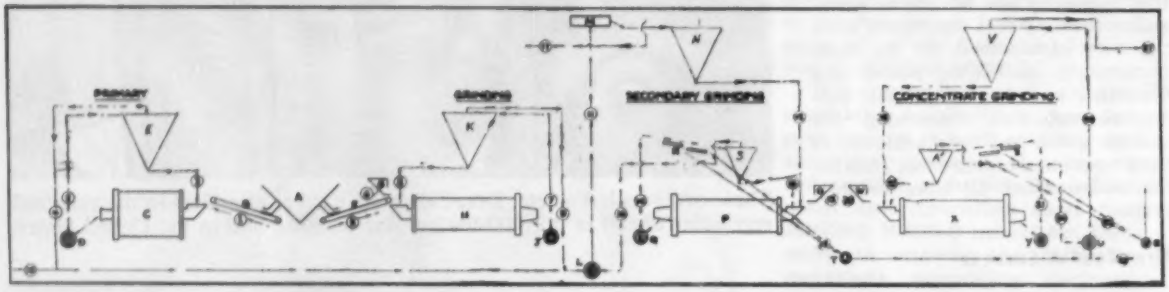
MATERIAL PROCESS FLOW PLAN

With Equipment Types and Description

Gold Mill Grinding Section

Rand Leases (Vogelstruisfontein) Gold Mining Company Limited

Krugersdorp, Union of South Africa



MATERIAL PROCESS FLOW PLAN
(Indicated by sequential numbering 1 to 27)

1. Ball mill feed.
2. Ball mill overflow.
3. Cyclone oversize to ball mill.
4. Cyclone undersize.
5. Primary tube mill feed.
6. Primary tube mill pebbles.
7. Primary tube mill overflow.
8. Secondary cyclone oversize.
9. Secondary cyclone undersize.
10. Crushing plant washings.
11. Pulp to cyclone.
12. Cyclone oversize.
13. Secondary tube mill pebbles.
14. Secondary tube mill overflow.
15. Cyclone oversize.
16. Cyclone undersize.
17. Pulp to cyanide plant.
18. Plane table concentrate.
19. Cyclone oversize.
20. Grinding pebbles.
21. Regrind tube mill overflow.
22. Cyclone oversize.
23. Plane table concentrate to clean-up.
24. Cyclone undersize.
25. Clean-up tailing.
26. Total feed to cyclone.
27. Cyclone undersize to cyanide plant.

EQUIPMENT TYPES AND DESCRIPTION
(Indicated by sequential lettering from A to B')

A. Mill bin.
B. Two ball mill feed belts.
C. Two 9 by 10 ball mills, 18 R.P.M.
D. Two 8-inch centrifugal pumps.
E. Two 26-inch cyclones.
F. Eight primary tube mill feed belts.
G. Eight pebble bins for tube mills.
H. Eight tube mills, 6.5 by 20 feet, 26 R.P.M.
J. Eight 5-inch centrifugal pumps.
K. Eight 26-inch cyclones.
L. Four 12-inch centrifugal pumps. Two as spares.
M. Two 5-way distributors.
N. 10 26-inch cyclones.
O. 10 pebble bins for secondary tube mills.
P. 10 secondary tube mills, 6.5 by 20 feet, 26 R.P.M.
Q. 10 5-inch centrifugal pumps.
R. 10 plane tables, 3.5 by 9.5 feet.
S. 10 26-inch cyclones.
T. Four 2-inch centrifugal pumps.
U. One 6-inch centrifugal pump.
V. One 26-inch cyclone.
W. One pebble bin.
X. One tube mill 6.5 by 20 feet, 26 R.P.M.
Y. One 5-inch centrifugal pump.
Z. One 3.5 by 9.5 foot plane table.
A'. One 26-inch cyclone.
B'. One 22-inch centrifugal pump.

cyclone was set, the area of spigot discharge and overflow determined, and the right liquid-solids ratio determined, a high feed pressure was not essential. At the outset, it proved extremely difficult to obtain true samples from both the underflow and overflow. Slight alterations to the installation removed these difficulties and quite steady results were then achieved, which were in every way comparable to those previously obtained with the bowl classifiers.

Power Outages No Trouble

During the course of the experimental work, when the plant was operating with a very heavy circuit, a power stoppage occurred. There was the customary wild rush to open release valves and drop loads to avoid the binding of the classifier rakes. As is well known on such occasions, it is often a matter of three to four hours before the mill can again be brought into full and efficient operation. In the case of the mill equipped with the cyclone, there was neither rush nor fuss. The load in the cyclone was found to be small enough to be drained in the ball mill itself without any spillage. As there are no moving parts in the cyclone, there can be no binding and the grinding mill can be brought into operation at full load the moment the power comes on again.

After some weeks of test, it was decided to substitute routine operators for the skilled technician who had been in charge of all test work. During the following two months, no trouble was met with and the only worn part was the spigot—a 6 inch cone lined with Linatex which had to be replaced after 42 working days—that is, 1,008 hours. Although much detailed test work remained to be done, it was decided to defer this to a later date and proceed with the complete installation of cyclones in the secondary circuit. The basic reason for such haste was that several metallurgical plants were being planned for the new gold mines in the Orange Free State, and very considerable savings could be effected both in buildings and equipment by substituting cyclones for the conventional classifiers. The case for cyclones would be strengthened considerably by having results on a complete plant scale. The installation was completed in a comparatively short time and at the time of writing the cyclones have been in commission for over 12 months. No difficulties of note have been encountered and the results are, if anything, slightly better than those formerly obtained from the far more expensive bowl classifiers. One change has been made—the new cyclones are 27-inch units instead of 24-inch.

Thus a rapid advance has been made from the experimental to the practical. Tremendous interest was aroused by the success of the cyclones as classifiers and the installations at the Rand Leases mill have been inspected by technicians from all parts of South Africa. So great was the demand for information that it was decided to present this in a paper delivered to a meeting of the Chemical, Metallurgical and Mining Society of South Africa in March

1953. Within a few weeks every South African mining group was testing the cyclone as a classifier and many mills have now actually installed them. Reports from all plants are that the results being obtained are very satisfactory. In one particular case, some difficulty was experienced, due to the spigot constantly choking. This was caused by the quantities of reject pebbles being discharged from the grinding mill. In this case, the spigot could not be enlarged as this would involve returning to the mill a higher tonnage than the mill could handle. The difficulty was solved by elevating the cyclone and feeding the spigot return to three mills instead of one. This enabled a much larger opening to be used and eliminated the choking. Privileged to inspect the installation, the writer was impressed by the fact that one small 27-inch 20° cyclone, costing about $840.00, had replaced three bowl classifiers, costing $33,600.00 and now standing idle. The smaller, less costly cyclone does the work equally well. On the practical side, the use of the cyclones in secondary grinding circuits has proved an unqualified success.

Comparison of Results in Primary Grinding Circuit at Rand Leases (Vogelstruisfontein) Gold Mining Company Limited, Krugersdorp, Union of South Africa

Product*	Type of Classifier									
	Dorr duplex rake classifier 10 by 26 foot Installed cost: $4,900.00					Cyclone† 27 inch by 20° Installed cost: $896.00				
	Tonnage	Mesh size by percent				Tonnage	Mesh size by percent			
		Plus 48	Plus 100	Plus 200	Minus 200		Plus 48	Plus 100	Plus 200	Minus 200
Feed	3,900	64.6	13.4	6.7	15.3	3,900	64.6	13.4	6.7	15.3
Underflow	2,680	72.0	13.0	5.0	10.0	2,640	70.0	15.0	6.0	9.0
Overflow	1,220	33.0	22.0	15.0	30.0	1,260	31.0	23.0	15.0	32.0

* The tonnages given are for tons solids.

† 4-inch feed aperture, 7-inch vortex finder, underflow nozzle (spigot) 2 3/4-inch, feed pressure 2.0 to 4.0 pounds per square inch.

Primary Circuits

It was not very long before the idea of utilizing cyclones in primary grinding circuits came up for consideration. Of course, it was realized that the products to be handled, being much coarser, would naturally be much more abrasive and that the maintenance costs would be much higher. However, in the cyclones installed for secondary classification, fabrication in sections and the use of Linatex lining had reduced abrasion wear to such an extent that it was decided to proceed with a test on the primary circuit. There was no doubt whatever as to the ability of the cyclone to give the desired products in this new application. The only question concerned the possibility of excessive wear with the consequent necessity for frequent stoppages for renewals and a loss of tonnage. There was but one way of determining this and that was by actual test.

Two new cyclones were made and fully lined, using a slightly heavier grade of Linatex. One was installed in closed circuit with a primary mill with a new feed of 600 tons per day and a circulating load of approximately 250 percent. The second was installed in a ball mill circuit with a new feed of 1,200 tons per day and approximately the same circulating load. These proportions were maintained during the test period as they represented the most drastic conditions under which the cyclone would operate. After a long test, it was found that, though the wear was naturally higher in these applications, it could not be considered excessive and that there was the possibility of considerable savings in both capital and operating costs. In the case of the ball mill, the spigot gave a life of 144 hours, and in the primary tube mill the life was about 560 hours. Since most plants operate on a 6-day week, it is obvious that there would be no necessity for stoppages for renewals during the week. These could be effected on Sundays when the plants are not operating and the bulk of the maintenance work is done. Furthermore, since there are no moving parts, the possibility of stoppages due to unforeseeable mechanical failures is eliminated.

Comparison of Results in Secondary Grinding Circuit at Rand Leases (Vogelstruisfontein) Gold Mining Company Limited, Krugersdorp, Union of South Africa

Product*	Type of Classifier									
	Dorr bowl classifier 18-feet diameter, 8-foot rakes Installed cost: $11,200.00 plus.					Cyclone† 27 inch by 20° Installed cost: $896.00				
	Tonnage	Mesh size by percent				Tonnage	Mesh size by percent			
		Plus 48	Plus 100	Plus 200	Minus 200		Plus 48	Plus 100	Plus 200	Minus 200
Feed	1,800	17.0	30.0	20.0	33.0	1,800	17.0	30.0	20.0	33.0
Underflow	1,150	27.2	43.2	17.3	12.3	1,150	29.0	40.5	17.0	13.5
Overflow	650	0.3	8.5	21.7	69.5	650	0.2	7.6	22.6	69.6

* The tonnages given are for tons solids.

† 4-inch feed aperture, 6-inch vortex finder, conical underflow nozzle (spigot) 2-inch, feed pressure 4.5 pounds per square inch.

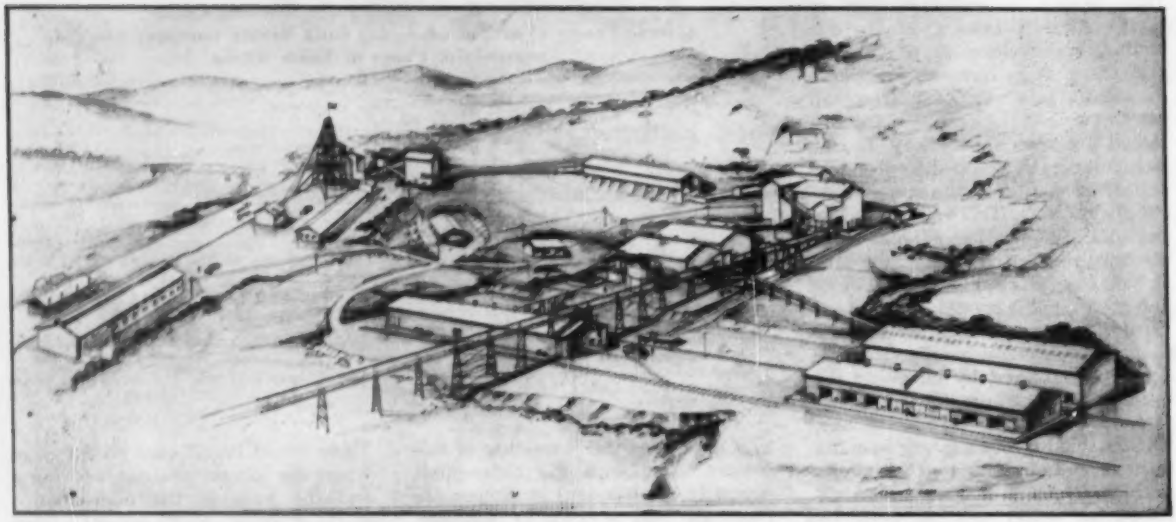
Easily Installed

The installation called for no additional floor space nor was there any necessity for structural supports. The area called for was so small that the device could be installed immediately above the feed hopper and supported by the existing floor. In both these installations, the grinding mill overflow had been handled by pumps delivering to an overhead conventional classifier. All that was necessary was to disconnect the pump line to the existing classifiers and connect up to the cyclones. This was an advantage as it actually involved a reduction in head against which the pumps were operating. The desired size gradations for both the underflow and overflow were obtained quite easily. It was found, too, that the cyclones gave the desired results when operated at a very low feed pressure—from 2 to 7 pounds per square inch. From these results it is obvious that cyclones would operate as efficiently and economically in primary circuits as they do in secondary.

Proved Results

The results outlined in this article have been confirmed very largely by tests carried out by practically every mining group on the Witwatersrand. The operators who have had experience in the use of cyclones are their keenest advocates because of their ease of control. The old bug bear of

(*Continued on page 75*)



This artist's drawing shows how the 1,200-ton-per day lead-copper concentrator and auxiliary facilities of Uruwira Minerals Ltd. at Mukwamba, Tanganyika will look when completed. Heavy media separation will be used to discard waste rock at a coarse size. Flotation will concentrate the HMS "sink" product.

New Uruwira Mill Discards 50% Feed by HMS To Triple Lead-Copper Flotation Head

Central Africa's most modern concentrator and one of the most modern in the world is now under construction. It is the 1,200-ton-per-day lead-copper heavy media separation and flotation plant of Uruwira Minerals Ltd. at Mukwamba, western Tanganyika.

The plant will use a 100 ton per hour Akins separatory vessel with a ferrosilicon medium to discard about 50 percent of the feed with a very low mineral content while almost tripling the grade of the "sink" concentrate. Rod mill grinding and bulk flotation produce a concentrate for shipment.

Funds for the new plant are being furnished by the United States government* with British, Belgian, French, and the Patino Mines and Enterprises also contributing funds.

It is of great interest to know that the mineralized district was discovered during a prospecting expedition in 1936 by J. de La Vallee who is now managing director of Uruwira Minerals Ltd. His faith that he had found what would be a large mine, together with his hard work and determination to achieve that mine, has been the driving force which is now about to reach a most successful conclusion.

Geology and Mineralogy

The entire district is intensely mineralized and a number of deposits with different mineral occurrences and associations have been partially developed.

Mesothermal mineralization occurs either in fissure veins or in crushed material in the shear zones. These zones are wide and strong with widths exceeding 300 feet. They are surprisingly straight and regular and have been found over strike lengths up to five miles. With these zone ore shoots occur irregularly distributed but having individual lengths varying from 300 to 1,500 feet. The fissure veins are as wide as 15 feet, but they have not been extensively developed to date.

The Mukwamba ore shoot is the largest developed in the Mpanda area and will be mined to supply ore to the new plant. Mineralization is galena with chalcopyrite, a little pyrite, some argentite with a gangue commonly of quartz and siderite which may carry barite and calcite. Of the metallic minerals pyrite came first, followed by chalcopyrite with low gold content. Galena is a late mineral. Precious metals have no relation to base metal content and are associated with final deposition of the lead minerals and particularly with late copper minerals.

Southwestern Designs Plant

In 1945, the Tanganyika government agreed to finance the construction of a branch railway, 130 miles long, to the mine from the Kaliua station on the central line of the Tanganyika Railways. The survey for this line was completed in 1946, and construction was completed in 1949.

A new company, Uruwira Minerals Limited, was formed in February 1947 to explore the area thoroughly and to erect a production plant.

Following extensive pilot plant metallurgical testing by Southern Minerals Limited of Salisbury, Southern Rhodesia, consultants and technical managers of the property, a successful method of low-cost concentrating of the ore minerals was determined. Data from the pilot

* In 1952 the Mutual Security Agency as agent for the Defense Materials Procurement Agency agreed to advance $1,640,000 to Uruwira for plant construction. The dollars plus 5.0 percent interest will be repaid by deliveries of copper and lead to United States stockpiles until Dec. 31, 1956. The United States also has a purchase option on up to 50 percent of production for 10 years after advance and interest have been repaid—Ed.

plant were used in the design of a modern concentrating plant engineered by the Southwestern Engineering Company of Los Angeles, California. This work is now completed and construction at the site has started.

New Hoist for Skips

A new hoist will be installed as part of the new mine development being undertaken. Manufactured by the Nordberg Manufacturing Company, it will provide a hoisting speed of 1,000 feet per minute for the five-metric-ton Kimberley skips. It will have rope capacity for eventual operation to the 2,000-foot level and is driven by one 500-horsepower General Electric ac motor with provision made for another similar motor to be installed when the deeper operations are undertaken. Double-deck cages are provided to handle 40 men per trip.

The new headframe is 105 feet from collar to sheave shaft and is designed for a combined breaking stress of 128 tons for the two 1¼-inch hoisting ropes. It is equipped with retractable guides of SWECO design for rapid change from skip to cage and vice versa. When making the change the guides are retracted and the skip is lowered on lazy chains hung in ears on the skip until supported on a geared chain hoist mounted on a trolley on a monorail. The hoisting cable is then clamped and disengaged from the skip which is rolled out of the way. The cage is rolled into position, hoisting rope is fastened, unclamped, the cage raised, guides replaced, and the lazy chains removed.

The skips dump into either the ore bin or waste bin of 250 short ton capacity each. The waste bin empties through an air-actuated arc gate to cars for disposal at the waste dump while the ore bin discharge is controlled by a flash-board type cut-off gate and a No. 6 Ross chain feeder controlling the flow through a 47½ by 63-inch opening. The Ross feeder is run at 5.6 revolutions per minute by Morse chain and sprockets from a 3-horsepower Falk motor reducer and feeds the material over a 4-inch grizzly made from 100-pound rail, flange up.

For economical mining wide sections of the shear zone must be excavated, with considerable resultant waste dilution.

Ring drilling with rib and panel stoping and/or continuous retreat along strike will be employed.

Plant Site

The physical location of the plant has controlled the structural and mechanical design to a great extent. The best location for the mill was on a gentle slope, unfortunately considerably above the shaft collar which required that the primary crushing section be located near the shaft since conveying large ore any distance would require heavy belt conveyors. Consequently, the crusher foundation has required extensive excavation at the shaft to keep the height of the head frame down. Also, with cheap labor, excavations are not as expensive as in the United States and every advantage has been taken of this fact. Even taking this into account, there is a difference of 100 feet between the shaft collar and the top of the fine ore bins at the mill and 800 feet horizontally. The result of these conditions is that the conveyor system to bring the crushed ore to the mill bins is some 1,300 feet long and inclined at a maximum angle of 18° wherever possible.

Primary Crushing

The maximum size of ore from underground grizzlies is expected to be 12-inch, using ring blasting underground. The oversize is crushed to 4-inch in a 36- by 42-inch-type HB Traylor jaw crusher at the rate of 185 short tons per hour. The crusher is driven at 175 revolutions per minute by a 125-horsepower General Electric wound rotor, 1,000 revolutions per minute motor, and "V" Belts. It is equipped with Farval automatic lubrication and has a two-piece main frame to accommodate the seaport handling equipment. The crusher grizzly undersize, estimated at 35 short tons per hour, by-passes the crusher and beds a 30-inch conveyor ahead of the crusher discharge which passes over a rock box onto an Australian bottom discharge chute to eliminate wear of the belt at the loading point.

The 30-inch conveyor is inclined at an 18° angle and the stream of ore passes under a suspended magnet. The belt is furnished by the B. F. Goodrich Manufacturing Company and is 5 ply 32 ounce "Longlife," with a 3/16-inch top cover and a 1/16-inch bottom cover. Belt speed is 150 feet per minute with a rated capacity of 370 tons per hour to handle the circulating load from the secondary stage of crushing. This conveyor discharges onto a 5- by 12-foot Hewitt-Robins eliptex single deck screen. Three sizes of screen cloth have been provided (1½, 2 and 2½ inches) to enable the heavy-

How the Uruwira Mill is Different

● **Discarded Waste**—Waste is discarded at as large a size as possible by differential density separation. This is of primary importance because economical mining of wide sections of the mineralized shear zone necessitates waste dilution.

● **Design for Location**—The mill had to be located above the shaft collar necessitating a long belt conveyor inclined at a maximum angle of 18°. The structural and mechanical design of the plant were controlled to a great extent by the physical location of the plant.

● **Buried Water Lines**—All of the 43 miles of water line to the plant, plus water storage tanks, had to be buried to prevent destruction by elephants.

● **Flexible Flowsheet**—The flowsheet is flexible so that ore can be sent directly to flotation, if desired, bypassing the HMS unit.

● **Uniformity of Tonnage**—Uniformity of tonnage feed to rod mills, minus-¼-inch, is assured by incorporation of a storage agitator ahead of the mills to take care of surges and only 10 hours daily of HMS operation.

● **Equipment Standardization**—Every attempt has been made in the plant design to standardize the equipment used so that there is a minimum variety of repair parts required for the operation. The cone crushers are duplicates and the screens used throughout the plant are all of the same width and design so that one spare vibrator unit can be used for replacement on all screens. This plant is 800 miles from the East African sea coast and is approximately one year in transport time from replacement parts from the United States. Consequently, the maintenance of the operating equipment will be of the greatest importance to insure continued efficient operation.

Uruwira Officials

LEFT TO RIGHT: R. Brasseur, Chairman; J. de La Vallee Poussin, Managing Director; and C. H. Richards, General Manager.

media separation (HMS) unit to operate at the optimum particle size. This will be determined subsequently when operation of the plant is started.

The plus-1½-inch ore, estimated at 150 tons per hour, falls to the secondary crusher which is a 4¼-foot standard Symons cone set at 1½ inches in closed cricuit with the above scalping screen by means of another inclined 24-inch conveyor running at 150 feet per minute.

Fine Crushing and Storage

The second crushing stage mentioned above and the third stage following the HMS unit both use standard 4¼-foot Symons cone crushers. These crushers use the newly developed coarse stepped liners of manganese steel and are equipped with auxiliary oil pumps, air seals, automatic tramp iron release and are each driven by 10 D "V"-belts and a 125-horsepower, 50-cycle General Electric squirrel cage motor.

The scalping screen undersize, minus-1½-inches, from secondary crushing is delivered to a coarse ore storage pile of 3,000-ton capacity by a 24-inch belt conveyor at 300 feet per minute, 220 tons per hour capacity, and another 24-inch belt conveyor equipped with a Stephens-Adamson manually operated tripper for distribution of the ore on the storage pile.

The 3,000-ton storage bin is excavated in the ground and a rigid frame structure carrying the tripper conveyor and the aluminum roof is supported on concrete retaining walls. Under the ore pile a tunnel is provided, in the roof of which there are 17 2- by 2-foot openings equipped with Stephens-Adamson rack and pinion gates. The ore flow is controlled by a 22-inch Stephens-Adamson manganese pan feeder traveling on rails from opening to opening as required. The quantity of ore discharged is controlled by a 3-horsepower Reeves vari-speed motordrive.

The pan feeder discharges onto a 20-inch belt conveyor with a speed of 175 feet per minute, which carries 120 tons per hour horizontally to another 20-inch inclined conveyor which delivers the ore to the washing screen ahead of the HMS unit. This conveyor is equipped with a Type "S" Merrick weightometer which weighs all the ore to be treated.

To prevent shutting these conveyors down under load, in case of mechanical troubles in the HMS plant, and also to supply ore to the flotation unit when it is not desired to run the HMS plant, a by-pass gate controlled by electrical interlock with the HMS circuits by-passes the ore automatically so that, unless the HMS plant is in operation, the ore is by-passed around it.

Importance of Sampling

To provide metallurgical control of the HMS plant, a sample preparation plant has been included in the plant design. Samples are taken mechanically of the weighed feed and the weighed tailing or float products. The initial samples of the 1½-inch feed and float product are taken continuously by two 36-inch heavy-duty Geary Jennings samplers with 7½- by 14-inch type C track mounted cutters. These samplers will cut out 1.0 percent of the ore, or 12 tons per day in the case of the feed with the HMS plant operating 10 hours per day and 7 tons of the float product estimated at a maximum of some 70 tons per day. These samples are conveyed by 12-inch belt conveyors to a two compartment storage bin with 12½ tons for the feed and 7½ tons for the float. Each of these bins is divided in half and the sampling plant is designed to treat all of the two samples in one 10-hour shift.

To crush the sample a Denver 9- by 14-inch jaw crusher now in use in the pilot mill on the property will be set to ½-inch. This product will again be cut at 1.0 percent by a 20-inch chain drive Geary Jennings sampler which will feed its sample to a MASCO 6-inch Gy-Roll reduction crusher to crush the sample to 10 mesh. Following this crushing stage, another 20-inch Geary Jennings will cut out 1/50 to 1/100 of the ore for the final sample for analysis. All rejects from the sample plant join the sink product of the HMS unit and are sent to the flotation unit for further treatment.

The wash screen preparing the feed to the HMS plant is a 5- by 12-foot Hewitt-Robins eliptex triple deck with ½-inch super gyraloy square opening screen on the top deck, ¼-inch of the same on the middle deck, and 14 mesh on the bottom deck. Washing of the material is provided by water sprays and the minus-14-mesh material is fed to a 30-inch SPDS Akins Spiral classifier. The plus - 14 - mesh, minus-¼-inch material joins the sand product of the classifier and the sink product from the HMS plant and is conveyed to the third crushing and screening stage. The plus-¼-inch material comprises the HMS plant feed.

The overflow product from the 30-inch classifier is laundered to a 30-foot Dorr thickener which recovers the water while the thickener underflow is pumped to a splitter box which divides the flow evenly to the two rod mills.

To prevent upsetting the rod mill operation by periodically feeding these fines, the overflow of the splitter box is pumped to a 16-foot-diameter storage agitator where it will be kept in suspension by a 48-inch impeller driven by a 25-horsepower motor. In this way the flow of fines from 10 hours of HMS plant operation can be spread out over the 24 hours of rod mill operation.

Akins Separatory Vessel

Good waste rock elimination by differential density separation at as coarse sizes as possible is of primary importance. Accordingly, the HMS plant provided for the operation is the standard 100-ton-per-hour packaged unit as sold by the Southwestern Engineering Company, using the Akins separatory vessel and ferrosilicon medium. The 48-inch Akins separator as developed by the Colorado Iron Works Company and described in the AIME *Technical Paper* No. 2182 of May 1947 has the distinct advantage of being able to

discard the middling particles and thus provides a convenient operating control. In the Uruwira plant, the sink, middling, and float are drained on a 5- by 8-foot single-deck Robins eliptex screen partitioned for each of the three products. About 90 percent of the medium will be recovered by this screen and returned by a 4-inch Wilfley pump to a steady head tank over the separator. The wash screen following the drainage screen is a 5- by 12-foot Robins eliptex again partitioned for the three products. The material washed off on this screen is cleaned on a 38-inch Jeffrey Company 2-drum type magnetic separator. The medium recovered by this machine is demagnetized, densified, and returned to the medium circuit, while the non-magnetic material is passed on to the flotation circuit for the recovery of any contained values.

Following the wash screen, the float product is conveyed to the tailing pile after being sampled. The middling and sink product are joined and sent to the third crushing and screening stage. After testing of the middling product when the plant is operating it may be found that further treatment of the middling would be advantageous in which case separate handling of the material can be added very easily.

The 1½-inch sink product, the middling, and the dewatered minus-¼-inch material join on a 20-inch belt conveyor equipped with a 20-inch Dings magnetic head pulley for removal of tramp iron. The conveyor discharges onto a 5- by 8-foot Hewitt-Robins eliptex single-deck screen with ¾-inch super-gyraloy screen cloth which feeds the plus-¾-inch material to the third crushing stage. The discharge of this crushing stage joins the minus-¾-inch material from the above screen on a 20-inch conveyor which conveys the ore to the fine ore bins.

This crusher is a 4¼-foot standard Symons cone and is a duplicate of the second stage crusher. This stage is not in closed circuit with the screen as the oversize passing the crusher will not greatly affect the rod mill operation and would require a greater equipment outlay.

Two 500-ton fine ore bins are provided at the head of the main mill building to store the ore from the last crushing stage before grinding. The feed is divided between the two bins by a reversing conveyor.

Cut Sliming with Rod Mills

In the pilot plant operation, which incidentally has kept the operation in the black, it was felt that tailing losses were caused by over-grinding with the consequent sliming of the lead. In the new mill, the grinding will be done by two duplicate units of 6- by 10-foot Marcy rod mills in closed circuit with two 54-inch simplex Akins classifiers.

The two mill bins are provided with three openings on the center line of the bottom. Each opening is controlled by a 20- by 20-inch Stephens-Adamson rack and pinion gate with a 12- by 20-inch Stephens-Adamson open-type rotary vane feeder delivering to 18-inch belt conveyors, each of which is equipped with a type "S" Merrick weightometer.

Two of the feeders on each bin are driven by Reeves vari-drive motor reducers while the third with its own Reeves drive is controlled—on or off—by constant weight switches actuated by the weightometers providing a simple yet effective automatic tonnage control of the rod mill feed. Since all drives are variable speed the amount of "hunt" by the third feeder can be adjusted to the best advantage.

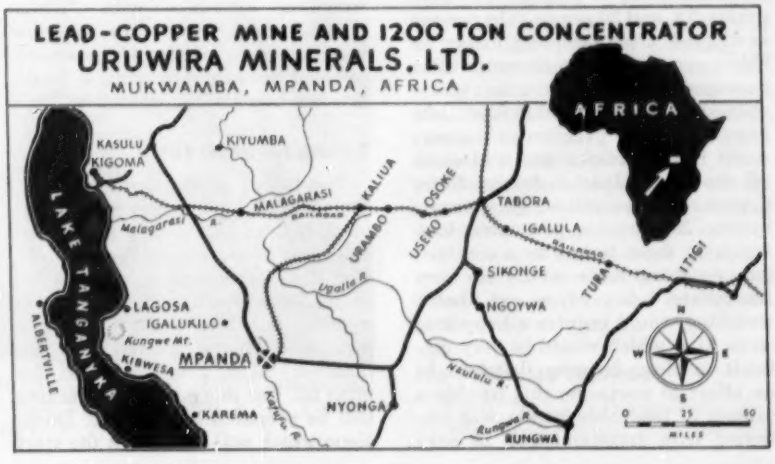
The grinding section and the flotation section are both on the same level in the building which is 80 feet wide and 100 feet long, broken into two 50-foot bays. Each bay is provided with Wright traveling cranes with Yale and Towne chain blocks for full coverage of both operating floors. The pumps are located in a tunnel under the flotation section with covered openings so that the cranes can be used also for maintenance work in the tunnel. Gravity flows in the plant are carried, in most cases, in open unlined wood launders with pressure flows from the pumps in standard black iron pipe.

The grinding circuit consists of two 6- by 10-foot inside liner diameter Marcy overflow type rod mills equipped with the smooth manganese steel liner with reversible lifter bars as developed at Stibnite, Idaho. They are fed from the fine ore bins at the rate of 305 tons per day, to which is added 25 tons per day of the thickened fines from the HMS washing screen to coat the rod charge and gain maximum capacity. Each mill is fed by a double scoop handling the circulating load and a drum type feeder taking the new feed. Each mill is in closed circuit with a 54-inch Simplex type "S" Akins spiral classifier which will overflow 330 tons per day at 25 percent solids, all minus-35-mesh.

Classifier overflows are combined and sampled by a Geary-Jennings automatic pulp sampler before being pumped to the flotation cells. All pumps used on the mill pulps are Wilfley type "K" sand pumps with overhead motor drives and standard white iron parts. Two sizes, 4- and 2-inch are used to handle all pulps. Fabricated steel sumps, as recommended by Wilfley, are placed ahead of each pump.

Three Stage Flotation

The flotation section is composed of two banks of rougher cells with two stages of cleaning. The roughers are 48-inch Agitair cells composed of 10 cells in groups of four and six with the froth from the first rougher fed to the first cleaning stage. The tailing from the first rougher is pumped to the second rougher which makes a final tailing. The froth from this second rougher is returned with the first cleaner tail to the flotation feed pump. The first cleaner froth is cleaned further by the second cleaner in closed cricuit with the first cleaner and makes the final concentrate. The cleaner cells are 18-inch Denver "Sub A's" with two cells in each stage. Tailing from the second rougher and the final con-



Results of Heavy Density Separation Tests at a 2.79 Specific Gravity Medium Test As Made on Uruwira Ore by South African Cyanamid (Pty) Ltd.

Product	Specific Gravity	Size	Weight Percent By Size	Weight Percent Total	Weight Percent Percent Lead	Weight Percent Percent Copper	Distribution Percent By Size Percent Lead	Distribution Percent By Size Percent Copper	Distribution Percent Total Percent Lead	Distribution Percent Total Percent Copper
Calculated Head				100.0	2.59	0.55			100.0	100.0
Head		Minus-10-mesh		9.5	5.40	0.82			19.8	14.3
Cone Feed			100.0	90.5	2.29	0.52	100.0	100.0	80.2	85.7
Sink	2.85		36.5	33.0	6.01	1.32	95.6	93.2	76.6	79.9
Middling	2.85-2.80		16.2	14.7	0.59	0.12	4.2	3.9	3.4	3.3
Float	2.80		47.3	42.8	0.01	0.03	0.2	2.9	0.2	2.5
Sink	2.85	plus-3/16-inch	34.8	31.5	5.83	1.28	88.6	86.0	71.0	73.7
Sink	2.85	minus-3/16-inch	1.7	1.5	9.65	2.26	7.0	7.2	5.6	6.2
Sink	2.85-2.80	plus-3/16-inch	15.3	13.9	0.53	0.11	3.6	3.3	2.9	2.8
Sink	2.85-2.80	minus-3/16-inch	0.9	0.8	1.59	0.36	0.6	0.6	0.5	0.5
Float	2.80	plus-3/16-inch	42.1	38.1	0.01	0.03	0.2	2.4	0.2	2.1
Float	2.80	minus-3/16-inch	5.2	4.7	0.01	0.05	00.0	0.5	0.0	0.4

centrates are each sampled by standard Geary-Jennings pulp samples for metallurgical control.

Reagents

Reagents use has been determined from the pilot plant operation. Reagent 404 and xanthate are fed to each rod mill scoop box while sodium sulphide and cresylic acid are fed to the classifier overflow at the sump of the flotation feed pump. Lime, in dry form, is fed from a Syntron vibrating feeder to each conveyor belt feeding the rod mills. All reagent mixing and feeders are located in a room above and ahead of the grinding section and duplex Clarkson reagent feeders are used for all solutions feeding into funnels where they are washed to the feed points by gravity flow in pipes. In this way all reagent control is centralized at one point for accurate and easy control. Supplementary single portable Clarkson feeders are provided to add frother wherever it may be required in the flotation circuit.

Filtering Problems Overcome

Concentrate to be produced, estimated at 66 tons per day containing 50 percent Pb, 10 percent Cu, 1,000 grams Ag, and 20 grams gold per ton is filtered, after sampling, using an Eimco six-leat 6-foot-diameter filter arranged for two products (future operation). Weighing this filter cake has presented a problem as the material is very sticky and will come off the filter blade in lumps. Since the concentrates will weigh approximately 250 pounds per cubic foot, weighing these lumps on a continuous weighing scale would be very inaccurate. Any type of batch weighing would require a hopper of some kind which would be very difficult to clean between batches. In an effort to overcome this trouble a sample of lead concentrate was obtained with approximately 12 percent water and a Syntron vibrating feeder pan was loaded with this material pressed into large lumps. The feeder was very effective in shaking out the lumps into almost a ribbon flow of the pulp. This idea was utilized in the Uruwira mill by providing an F33 Syntron feeder with a 12- by 55-inch pan taking the concentrate from a conveyor under the filter, shaking out the lumps and delivering the material to a belt conveyor equipped with a standard type "S" Merrick weightometer.

Concentrate Shipped in Bags

At present the camp is serviced by one train per week of 300-ton capacity, which will be stepped up to two 400-ton trains. However, due to port conditions and inadequate shipping facilities, storage must be provided for three months concentrate production or some 7,500 tons. Also the concentrate must be bagged just prior to shipment as the concentrate rots the bags quickly. To provide the necessary facilities, the concentrate is conveyed to a storage building with a distributing conveyor to load a storage pile uniformly. Space is provided all around the pile for bag loading and "Exact Weight" bag weighing machines with "Union Special" bag sowers are mounted together on a platform on wheels, forming two separate units, to facilitate the bag loading operation.

Tailing for Mine Fill

The tailing or float product from the HMS plant is weighed and sampled before being transported by conveyor to the tailings disposal pile. The flotation tailing is also carried by this conveyor after dewatering as much as possible. As the property is developed it is expected that the flotation tailing will be used for mine fill. For this purpose the tailing will be prepared by means of Dorrclone which will be used at the start to dewater the tailing prior to discard. The Dorrclone overflow will be thickened utilizing a 50-foot Dorr thickener now on the property with the thickened underflow placed on the tailings conveyor which, fortunately, is down grade.

Water Conservation

Water is recovered where possible in the plant and pumped back to a mill water tank. The HMS plant is supplied direct from the main water supply storage and the water used recirculated. The clear water is handled by Ingersoll-Rand size 3 CRVN single-stage centrifugal pumps, and it is expected that the water loss will not be over 60 gallons per minute.

All water for the operation has to be pumped some 43 miles from the Ugalla River. The water depth of this river varies some 22 feet from the lowest recorded level to the highest recorded flash flood. The first pumping station is excavated at the river bank 10 feet deep, so as to allow two feet of freeboard above the highest flash flood level. The suction line of the two pumps is carried 168 feet from the pump to the foot valves by floats so that the foot valve is just below the water level at all times. The flexing is to be provided by two 12-foot lengths of Gates Rubber Company rubber suction hose.

Elephant Problems

The pumps are two Gardner Denver FD-FXD 5- by 10-inch duplex double action power pumps, 200 gallons per minute capacity, driven with Caterpillar Diesel engines of 68 and 75-kw capacity. The pumps discharge into two 6-inch pipe lines which are 1¼ miles long until they join into an 8-inch line, 15½ miles long, which then divides again into two 6-inch lines, 3¾ miles from a second pumping station. The second pumping station is a duplicate of the first except that it is above ground.

(*Continued on page* 77)

PALLBEARERS for deceased Pb-Zn mines are F. M. Marr, left, assoc. pres. and K. W. Jasper chairman.

MINERS GIVE SPIRITED OPINIONS

Northwest Mining Convention Discusses Two Major Mining Problems; Temporary Solutions Seen in "Escape Clause" and D'Ewart Bill

Two major problems are facing the metal mining industry, Frank N. Marr, association president, said at the opening address of the 59th Annual Convention of the Northwest Mining Association in Spokane, Washington. These problems are the low prices of lead and zinc and the proposed changes in the public land laws, which would take away many of the statutory rights of the miners.

A special welcome was extended to the many Canadians among the 530 convention attendants by Mr. Marr, who is president of the Spokane-Idaho Mining Company. Canada and the United States have mutual problems in the metal mining industry, he said.

The two-day convention, held at the Davenport Hotel, began on Friday morning, December 4, 1953.

Ask Escape Clause Relief

United States lead-zinc producers asked for immediate "escape clause relief" at the November hearings of the United States Tariff Commission, Charles E. Schwab, manager of industrial relations, Bunker Hill and Sullivan Mining and Concentrating Company, said at the first general session. In a summary of the lead and zinc tariff commission hearings, Mr. Schwab said that under Section 7 of the Reciprocal Trade Agreement Act, the commission has the power to recommend a 50 percent increase in tariff "existing on January 1, 1945." The commission can propose an increase in duty of about three cents for both metals combined. A combined price of 32-33 cents is needed in the Coeur d'Alene, Idaho and Metaline Falls, Washington districts to sustain a profitable and continuing lead-zinc industry, but, he continued, any increase in price, however modest, is a step in the right direction.

NEW OFFICERS for the association from left are K. W. Jasper, president; P. E. Oscarson and R. E. Sorenson, vice presidents; and R. J. Towne, secretary.

U.S. Miners State Facts

During the four days of the Tariff Commission hearings, the domestic producers presented an unsurpassed record of factual material.

The Idaho and Washington Emergency Lead-Zinc Committee presented the most forthright report of all the United States districts, he said. Operators from 18 lead-zinc mines in the Coeur d'Alene and Metaline Falls districts compiled a resume of their expenses from January 1, 1946 to mid-1953. They tabulated tons of ore mined, its assay, quantity and metal content of concentrates, net smelter returns, cost of wages and salaries, other direct costs, depreciation, depletion, federal income tax, and finally, net profit or loss.

No Subsidies Wanted

A flat "No" was the domestic producers' answer when the opposition

GENERAL SESSION speakers, left and right, were C. E. Schwab, Bunker Hill and Sullivan and J. E. Hogle of J. A. Hogle and Co. In the center is J. C. Kieffer, A.S.A.R. Co., chairman, Columbia Section of A.I.M.E.

claimed that the present lead-zinc situation could be solved by subsidies. Only one thing, the producers pointed out, had driven metal market prices down so low—un-needed imports. And subsidies will do nothing to correct excessive imports.

The Canadian Metal Mining Association representative pointed out that there must be a mutuality of trade between Canada and the United States and opposed any tendency to close United States markets to Canadian products because: Canada is not a low wage country; the Canadian dollar has not depreciated in value; some lead-zinc mines in Canada have been shut-down; and Canada can be depended upon as a reliable source of supply to meet the deficit between the United States consumption and production.

Mr. Schwab said that domestic producers had no quarrel with these statements. However, he continued, if the United States absorbs the exportable surplus of lead and zinc from Canada, how can we at the same time import lead and zinc from Africa, Peru, Bolivia, Mexico, and Australia without having the market prices for these metals driven down so low that major portions of domestic industry can only operate at a loss or close down?

Miners' Rights in Danger

"A measure such as the Hope Bill (H.R. 5358) will place the miner and prospector almost wholly at the mercy of the U. S. Forest Service—a powerful bureau both unsympathetic to and ignorant of mining." Roger H. McConnel, chief geologist, Bunker Hill and Sullivan Mining and Concentrating Company, Kellogg, Idaho, told miners at the Land Law Session. The Forest Service, a strong backer of the Hope Bill, has a powerful propaganda machine which is placing its half-truths and outright falsehoods in every household in the United States, he continued.

In reference to that part of the Hope Bill which would invalidate new claims if the deposits are determined to be insufficient to justify further development of the claim as a mining property, Mr. McConnel said, "Who is wise enough to make such a determination for all time? I have seen many claims, particularly in the Coeur d'Alene district, which look hopeless on the surface, yet have overlain some of our greatest ore bodies. No examiner from either industry or the Forest Service can see through solid rock and honestly assert that further development of a claim is completely without hope."

The D'Ewart-Dworshak (H.R. 4983-S. 1830) bills now before the Senate, he said, will adequately protect miners, lumbermen, recreation enthusiasts, and the Forest Service against the chiseling few who misuse the privilege of staking a mining claim. Yet at the same time, such changes in the law will not remove the incentive to prospecting. He urged that all mining men and others let their thoughts on these bills be known to their congressmen.

Mining Needs More Publicity

"It is time we told our story to the people," said James E. Hogle, managing partner, J. A. Hogle and Company, Salt Lake City, at the first general session. "We should let the people know how really dependent they are upon us. Let us gain their goodwill and support, which we deserve." Very few industries, he continued, take the risks we do; very few require the intelligence, ability, guts, and hard work; and if the people, particularly the hundreds of thousands who have invested in our industry, realize these things, then we will find ourselves in the position so rightfully ours.

How Canada Helps Miners

The Federal Government in Canada helps the mineral industry in three ways, Marc Boyer, deputy minister of mines and technical surveys, Ottawa, Canada, told luncheon guests Saturday.

Moral help is given by recognizing that the principle of free enterprise should govern in Canada and that the pioneering spirit should not die. A friendly attitude and inter-

MOOSE MILK AND MUSIC were featured at the Saturday morning Sourdough breakfast for the "menfolks only."

est in their problems is assured the mining industry by the government.

Technical help to the mining industry rests upon the Department of Mines and Technical Survey. Within this department two branches out of five, namely, the Geological Survey of Canada and the Mines Branch, provide direct technical assistance to the mining industry.

Financial aid is provided by many means. Various concessions are made to the mining industry in the income tax and other Acts of the Federal Government. Some of these concessions are: three-year exemption from income tax for new mines; an impressive list of mining machinery and equipment can enter Canada duty free; corporations whose principal business is mining or exploring for minerals are permitted to claim against income, expenditures directly or indirectly incurred in prospecting, exploration, and development; and there is no taxation on amounts received by prospectors or grubstakers for mining properties that have been prospected, explored, or developed by them.

Mr. Boyer then went on to say that to a considerable extent the United States benefits from the help given to Canadian miners. United States mining corporations doing business in Canada, the investors, the industry, and the United States government all benefit by this help.

Practical Problems Aired

Many technical sessions were held during the two-day meeting. The A.I.M.E. and the British Columbia Section of C.I.M. sponsored three of the sessions. Twenty-five papers were presented by prominent mining industry men, as well as by members of the U. S. Geological Survey and the U. S. Bureau of Mines.

GOOD NEIGHBORS are Washington Governor, Arthur B. Langlie and Marc Boyer, Canadian Deputy Minister of Mines. Close cooperation between the two countries is a mining necessity.

Use Wooden Rock Bolts

Wooden bolts, from 4 to 6 feet long, are successfully being used to support the soft and broken ground of fault zones at the Day Mines, Inc., in Wallace, Idaho. These bolts are made of Douglas fir and are two inches in diameter. The end that is placed in the hole has a standard slot for the wooden wedge. The headboard end of the bolt is square and is also slotted for a wooden wedge.

Two-inch mill slabs are used for headboards. Each of the headboards has been trimmed to size and has a two-inch hole drilled in it for the bolt. The bolt must be placed through the hole in the headboard before it goes into the hole drilled in the ground. The bolts are tightened in the ground by a stoper with a special driving adapter. Next, the headboard is tightened against the ground by driving a wedge into the headboard end of the wooden bolt.

Rollin Farmin, assistant general manager for Day Mines, Inc., said that wooden bolts have been used in the Day Mines since early 1951. The Korean hostilities interrupted the supply of steel for steel bolts and consequently wooden bolts were tried.

There are three special fields for wooden bolts at the Day Mines, Mr. Farmin told the A.I.M.E. Technical Session attendants: first, for support of mineralized ground which may be stoped later; second, for support of new mine openings in soft ground and fault zones; and third, to reinforce support of heavy ground that is crushing timber sets in existing workings.

The wooden bolts are much better than steel bolts for soft ground or gouge. The steel wedge used with the steel bolt will be driven into the soft ground at the bottom of the hole and fails to spread the wings of the bolt far enough to hold the bolt in the hole. Wooden bolts and wooden wedges do not have this trouble.

He also said that the wooden bolts are much easier to blast out when stoping operations begin.

DELEGATES "Take 5" from technical sessions to have lunch and visit with many of their old friends.

Ore Mined After Grouting

High pressure grouting has enabled the Deep Creek mine, Goldfield Consolidated Mines Company

at Colville, Washington to mine its ore body on the 550 and 650 levels. An estimated potential of 5,000 to 6,000 gallons of water per minute had to be shut off before the lead-zinc ore could be mined. A. V. Quine, superintendent of Goldfield Consolidated, said that over 30,000 feet of drilling had been done and that 20,000 sacks of cement were used to control the water.

Two types of drills were used for the grout holes. Diamond drills were used for long holes and 4-inch drifters with sectional steel for the shorter ones. All holes were drilled to water and then grouted. After the grout had set, the holes were re-drilled until more water was encountered.

As a considerable amount of sand and broken rock was hit by most of the holes, it was necessary to wash each hole before grouting. Colored water was used for the washing process, and to show any connection between holes.

A small amount of sawdust was added to each batch of grout to help seal off the larger seams. Grouting pressures of 500 to 600 pounds per square inch were used.

Of all the holes grouted, only one showed any return or connection with the other holes. Many of the holes were drilled only a foot apart.

U. S. Inadequately Mapped

Only 12 percent of the continental United States has been covered by geologic mapping in a manner and scale sufficient for our present needs. And only one percent of Alaska has been covered in a similar fashion. However, about 20,000 square miles annually are being mapped by the geology division of the United States Geological Survey, Mr. Charles A. Anderson, told attendants of the geological session.

In order to increase the rate of geologic mapping, aerial photographs for office compilation of geologic maps will be used wherever they are feasible. This office use of air photographs for making geologic maps is known as "photo geology."

Mr. Anderson, chief, Mineral Deposits Branch, United States Geological Survey, emphasized that the Survey has been most fortunate in that many of the mining geologists associated with the mining industry are helping a great deal in the detailed studies of mining districts. In some districts, company geologists have been given permission by their company officials to share in the writing of those sections of the report that deal with their company mine. He said that the geological survey would like to expand on this practice. Such a plan is under operation in the Coeur d'Alenes.

Jasper Is New President

Karl W. Jasper of Spokane was elected president of the Northwest Mining Association at a meeting of the trustees. Mr. Jasper is president of the Grandview Mines and Grandview Mining and Leasing Company. He is also secretary-treasurer of the Pacnor Mines, Inc.

The two newly elected vice presidents of the association are Robert E. Sorenson of Wallace and P. Evans Oscarson of Spokane. Mr. Sorenson is vice president, chief geologist, and engineer for the Hecla Mining Company. Mr. Oscarson is a consulting geologist.

Robert J. Towne, equipment dealer in Spokane, will be the new secretary of the association. E. K. Barnes was the only 1953 association officer to be reelected, and will continue as treasurer. He is executive vice president of the First National bank in Spokane.

PRACTICAL PROBLEMS were brought out after many of the sessions. Shown from left to right, talking things over, are G. Crosby, Day Mines and A. E. Weissenborn, U.S.G.S., R. Wilmot, consulting engineer, V. McDowall, Lovite Mining Co., R. J. Hundhausen, U.S.B.M. and M. Brown, Sidney Mining Company.

GEOLOGY is the topic being discussed by R. A. Watson, Great Northern Ry., V. C. Fryklund, U.S.G.S., and R. W. Swanson. A. V. Quine, center, Goldfield Consolidated Mines, talked on grouting. P. E. Oscarson, Spokane consulting geogolist, R. H. McConnel, and C. J. Parkinson (right) were law session speakers.

HOW TO HEAT AND STRAIGHTEN BENT SHAFTS WITH TORCH

It is surprising how few machinists know the procedure for straightening a bent shaft reports John Zollinger, maintenance superintendent, MacIntyre Development, National Lead Company, Tahawus, New York. Methods used in the shop at Tahawus are herein outlined by Mr. Zollinger.

Only a few days ago, the shop received a four-inch-diameter axle, marred with actually hundreds of ball pean hammer marks distributed over its entire 12-foot length. Aside from the time it must have taken to do the work, the result certainly looked like a botched-up job. This same method is still used in paper mills where large shafts are used and very little run out can be tolerated in their operation. It seems to be the common understanding that if a shaft is bent as shown in Figure No. 1, the material along line "A" has to be elongated to force the curve into a parallel line with the axis. This no doubt can be accomplished, but it is time consuming and certainly cannot be done to a highly finished piece of work.

In describing the method used in National Lead Company's Titanium Division shop, it may be well to keep in mind that any piece of work which can be straightened by the peaning method may be handled much faster and without injury to the finish in the manner discussed below.

First of all, the principle is reversed; in place of using a ball pean hammer, the flame of an acetylene torch is used. Taking the shaft shown in Figure No. 1, heat is applied at the high side of the bend (see Figure No. 2), concentrating in the center and diminishing towards both ends. The application of heat will then further bend the shaft or, as you might say, aggravate the condition. Heating is continued until the bend is twice the original severity. For example, if a straight edge is laid along the concave side of the shaft and the greatest offset, as shown in Figure No. 3, is 0.062 inch, the heating process is continued until the gap becomes 0.125 inch or greater. So far, it has been impossible to work out a formula regarding how far to go with the first heat, since each problem varies as to size of shaft, length in which a bend must be corrected, and the characteristics of the material. We have straightened drill stems 30 feet long, seven inches in diameter, where the depth of the concave measured ½ inch and movement continued until it reached 1¼ inches. It is safe to start by doubling the initial run out and then seeing what the first result in correction will be. Again referring to Figure Nos. 2 and 3, assume, as stated before, there is depth of 0.125 inch. The heat is stopped and the shaft allowed to cool off. The process may be hastened by applying air as a coolant. As the shaft cools, the motion is reversed and the shaft rapidly goes past the original distortion of 0.062 inch and may become inactive at 0.015 inch. Now there is something to work with, and a little calculation will probably facilitate bringing it to zero with another

Figure No. 1 (exaggerated bend).

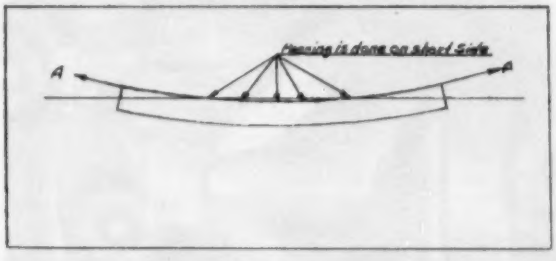


Figure No. 2 (exaggerated bend).

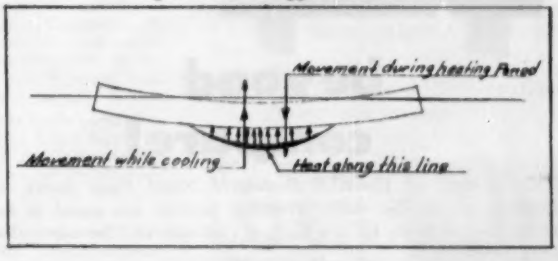


Figure No. 3.

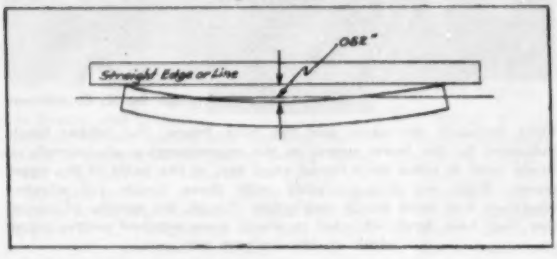
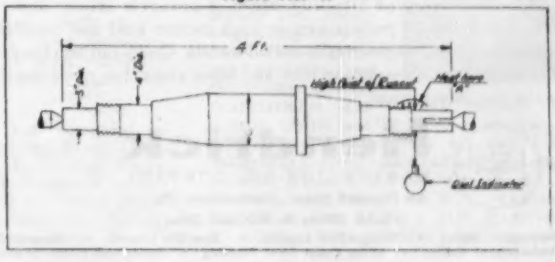


Figure No. 4.



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heat. Care should be taken that heat is applied without discoloring the piece of work and yet the heating should be done quickly.

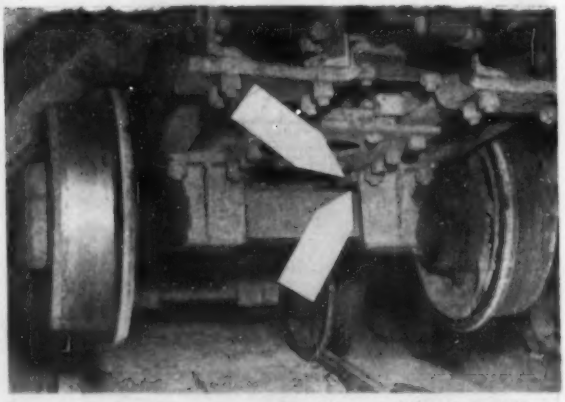
To illustrate how practical and accurately this method can be used without injury to the steel or the machined finish, consider a shaft which is driven at 1,800 revolutions per minute by a 250 horsepower motor, direct connected. Several of these shafts (Figure No. 4) have been treated at the shop in the above manner, with very good results.

The shaft is held between centers, (should no centers be provided, it can be chucked at one end and steady rest used at other end) and a dial indicator placed *under* the run out location of the shaft. In this case, the shaft is bent at the shoulder against the four-inch-diameter. Revolve to find high spot which is left in the top position. The run out is found to be 0.012-inch total indicator reading; therefore, set the indicator at 0.012 inch to zero. If the diameter at this point is large enough, the indicator can be left in place without damaging results from the torch, or a plate may be placed across the ways of the lathe to facilitate removing and placing the indicator. Apply heat at point "A" and watch the indicator go to 0.012 inch past zero, or over. Stop heat and let cool. The result, let us assume, will be 0.006 inch. Repeat the procedure until the desired limits are obtained. It is possible, with a little practice, to come within 0.0005 inch to true indicator reading and the piece will not be marred. It may happen that you will go past the limit, in which case the treatment will be the same with heat applied on the opposite side.

The method described above has successfully been used on motor shafts of various sizes or wherever the distortions are not too severe. How far one may go with this method can be learned through a little expeence in a particular field.

INSPIRATION CUTS CAR WEAR

As in most high-speed haulage operations, car truck and body maintenance has always been a major item at Inspiration Consolidated Copper Company's underground properties in Arizona. In an attempt to reduce this cost, Inspiration engineers devised a system of cushioning the shocks inherent in rail haulage by using a rubber



Photograph by H. B. Whitney

block between the axles and the truck frame. The rubber block, indicated by the lower arrow in the accompanying photograph, is firmly held in place by a lipped steel key, at the point of the upper arrow. Wear on cars equipped with these simple yet effective absorbers has been nearly negligible, though the months of operation they have been subjected to would have required serious repair work on conventional cars.

ACTIVITIES OF U. S. MINING MEN

A. L. FOSCUE has been appointed president of the United States Vanadium Company and the Electro Metallurgical Company, Divisions of the Union Carbide and Carbon Corporation. He succeeds WALTER E. REMMERS who becomes chairman of both divisions and a member of the appropriations committee of Union Carbide. Mr. Remmers is also a vice president of Union Carbide. Mr. Foscue started with the company in 1924.

Richard S. Werner, geologist, has been added to the Spokane, Washington staff of the Bear Creek Mining Company, a subsidiary of the Kennecott Copper Corporation. The Spokane district office was established in 1952 to expand the firm's exploration department.

R. Ward Grosz, former mining engineer at the Mountain Iron, Minnesota mine of the Oliver Iron Mining Division of United States Steel Corporation has been appointed to the general office staff of the firm's Duluth, Minnesota office. **George T. Beardshear** has been named supervisor of engineering at the Hibbing, Minnesota district office, and **Robert R. Wallace** has been appointed engineering supervisor for Oliver's Sherman group of mines near Chisholm, Minnesota.

New trustees of the Northwest Mining Association who will serve three terms are **Kuno Doerr**, manager of American Smelting and Refining Company's East Helena, Montana smelter; **S. M. Strohecker**, Seattle, Washington district manager of E. I. du Pont de Nemours & Company's explosive department; **Elmer E. Johnston** of Spokane, Washington, president of the Silver Dollar Mining Company; and **David E. Watson** of Spokane, treasurer of Thomas Consolidated Mines, Inc. Retiring trustees are **Joseph C. Keiffer** of Wallace, Idaho; **J. W. Melrose** and **Robert J. Towne**, of Spokane; and **Earl R. Marble** of Tacoma, Washington.

PROFESSOR ARTHUR P. WICHMANN has been appointed acting head of the Metallurgy Department of the Colorado School of Mines at Golden, Colorado. Professor Wichmann has had experience in copper production in Alaska and Chile, and in various milling and smelting operations in western United States. During World War II he served as Chief of the Copper and Aluminum Sections of the Office of Civilian Supply in the War Production Board in Washington, D. C. He attained the rank of full professor in 1952.

E. F. Ziolkowski, mining engineer, recently joined the engineering department of Pickands Mather & Co.'s Ironwood, Michigan Gogebic range operations. **Eugene Carlson**, formerly with the Montreal Mining Company's engineering department in Montreal, Wisconsin, is now with the Newport mine district engineering department also.

J. S. Kirkpatrick, vice president of Brooks & Perkins, Inc., has been re-elected president of the Magnesium Association. **L. G. White** of Dominion Magnesium, Ltd., was named vice president and **J. V. Cosman** of the Superior Bearing Bronze Company was elected treasurer.

Ernest Hart, vice president of Food Machinery and Chemical Corporation, and **W. N. Williams**, vice president of the Westvaco Chemical Division of Food Machinery, recently toured the company's plant at Rock Springs, Wyoming. The plant now ships 12 to 20 cars of soda ash daily. Mr. Hart reportedly said that future plans include development of the company's leucite (KSi_2AlO_6) deposits at Superior, Wyoming.

John H. Dismant, former Salt Lake City, Utah mining engineer, has been named assistant metallurgist in the division of industrial research at the Washington State Institute of Technology at Washington State College, Pullman, Washington. Mr. Dismant has been an experimental engineer at the United States Bureau of Mines' oil shale experiment station at Rifle, Colorado, and an assistant professor of metallurgy at the New Mexico School of Mines.

Promotions in the supervisory staff of the Minnesota Iron Ore Division of Jones & Laughlin Steel Corporation include **Paul W. Kruse**, district superintendent of the Eastern district; **John F. Linden**, district superintendent of the Western district; **Clarence H. Sleeman**, assistant to the manager; **H. W. Gillespie**, superintendent of the Schley-Pettit Mines; and **William Ball**, superintendent of the Longyear Mines.

Hugo E. Johnson has been appointed a vice president of the Lake Superior Iron Ore Association. Mr. Johnson has been assistant manager of the Project Development Group of the Battelle Memorial Institute of Columbus, Ohio, and has been associated with the Youngstown Sheet and Tube Company and the United States Steel Corporation in research and engineering positions. The Association, with headquarters in Cleveland, Ohio, provides iron mining companies with statistics on mining operations in the Lake Superior region.

Blair T. Burwell has resigned as superintendent of Inland Steel Company's Cayia mine at Crystall Falls, Michigan. He will join the Minerals Engineering Company of Grand Junction, Colorado of which his father, **Blair Burwell** is president. **W. P. Reed**, superintendent of Inland's Bristol mine, will supervise operations at the Cayia mine in addition to his present duties.

HARRY N. DUSELL has joined the metallurgical staff of the International Minerals & Chemical Corporation at Carlsbad, New Mexico. Mr. Dusell received his degree from the Wisconsin Institute of Technology. Since his graduation he has been with the Darwin Mines at Darwin, California; United States Vanadium Corporation at Bishop, California; and the San Manuel Copper Corporation at Tiger, Arizona.

C. J. Bastedo will head construction operations of the Highland ilminite plant near Lawtey, Florida for the Humphreys Gold Corporation. Other recently announced staff members for the Highland plant and for the already constructed Trail Ridge plant are: **J. C. Detweiler**, technical superintendent of both plants; **S. L. Jackson**, controller for Trail Ridge, Highland, and the Humphreys operation near Jacksonville, Florida; **Edward S. Beebee**, production superintendent at Trail Ridge; **John R. Powers**, supervisor of du Pont engineering at Highland; **T. H. Carey**, personnel and employee relations director at Highland and Trail Ridge.

Charles A. Tilford has been elected president of the Oom Paul Consolidated Mining Company of Idaho. Other new officers and directors are **Sidney Jones** of Burke, Idaho, vice president; **L. S. Eddins** of Wallace, Idaho, secretary-treasurer; **A. C. Stephenson** of Kellogg, Idaho, and **L. J. Randall** of Wallace, directors.

Arnold H. Miller, consulting engineer, has returned to his New York headquarters after doing consulting work in Spain, Algiers, Italy and France.

A. W. Hoover, office manager of American Smelting & Refining Com-

(*Continued on page* 101)

LEO F. REINARTZ of Middletown, Ohio, vice president of the Armco Steel Company, will serve as president of the American Institute of Mining and Metallurgical Engineers for 1954. New AIME vice presidents are THEODORE BENTON COUNSELMAN and HAROLD DECKER. H. DeWITT SMITH will serve as a director of the Institute for 1954. He has also been designated president-elect and will take office as AIME president in 1955. Directors elected for three year terms are E. C. BABSON, GEORGE D. DUB, RALPH E. KIRK, CARLETON C. LONG, EARL ROBERT MARBLE, and PHILIP J. SHENON.

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ACTIVITIES OF INTERNATIONAL MINING MEN

FRANK C. PICKARD, formerly mine superintendent at the Tsumeb Corporation Ltd. in Southwest Africa, is now mining sales representative for Gregg Car Company Ltd. Mr. Pickard will make his home in Brussels, Belgium which is the company's manufacturing headquarters.

Dr. K. P. Chikara, international consulting geologist with headquarters in Salisbury, Southern Rhodesia, has been on a trip to Europe to carry on geological investigations.

Andrea Giordana, professor of mineral dressing, has returned to his home in Jujuy, Argentina after a four-month trip to Peru.

Dr. Louis C. McCabe, chief of the fuels and explosives division of the United States Bureau of Mines is making coal investigations in the Philippine Islands and Japan. Mr. McCabe will inspect deposits on Cebu and Bataan for the Philippine government and the U.S. Foreign Operations Administration.

Woo Ka Lim, Foo Yin Fong, Goh Siew Hock, Ng Yin Fong, and Choong Sam, members of the Perak Chinese Mining Association of Malaya, have been appointed by the association to study government proposals for the renewal of mining leases and report back to the association.

Oscar Spenser, member for economic affairs; **H. S. Lee**, member for ports and railways; and **D. T. Waring**, trade division controller, represented the Federated Malay States at an International Tin Study Group Conference which was held in Geneva, Switzerland in December.

Sven Hjerdin, United Nations Technical Assistance Administration iron and steel consultant to NASSCO in the Philippines has returned to Sweden. Mr. Hjerdin has helped with the programming and construction of the Iligan steel mill of NASSCO in Iligan Lanao.

Professor H. S. W. Massey, British atomic scientist, recently visited in India for a short lecture tour on his homeward journey from an international conference on theoretical physics in Japan.

H. H. Taylor, general manager for the DeBeers Consolidated Mines Company Ltd., which operates the Kimberly diamond mines in South Africa, recently spent several days studying Climax Molybdenum Company's mining methods at the company's Climax, Colorado operations.

A delegation from the Sub-Committee of the United States House of Representatives Armed Services Committee recently visited in Malay for discussions with members of the tin and rubber industries. Those making the trip were J. P. S. Devereux; Lieut.-Col. F. L. Pfeiffer, U. S. Army escort; C. P. Ducander, counsel to the committee; O. C. Fisher; W. G. Bray; L. Johnson, delegation chairman; W. A. Winstead; and V. Wickersham.

J. W. King, Dale Roberts, and **Thomas L. Wells**, United States Atomic Energy Commission geologists have returned to the United States after surveying prospective uranium deposits in Peru. **Santiago Cardenas Vera**, proprietor of the San Francisco mine on the Moquegua and Puno borders has been in the United States to negotiate for reported uranium finds on his property.

A. E. Kruger, casting superintendent for the Electrolytic Refining and Smelting Company has left Australia to study fire refining of copper. While in the United States, Mr. Kruger plans to visit copper smelters and refineries of the American Smelting and Refining Company.

R. S. Overbeck, manager of Moengo mine of the Surinam Bauxite Company, Ltd., is now working at the company's head office in Paramaribo, Surinam. **H. van Arkel**, mining engineer, succeeds Mr. Overbeck as mine manager. Mr. van Arkel, who was formerly with the Billiton Company Ltd., has worked in the tin mines of Billiton and Banka, Indonesia, and at the Onverdacht, Surinam, bauxite mine.

Wesley Hippard, former mining engineer for Republic Steel Corporation of Chicago, Illinois, has joined the staff of Benguet Consolidated Mining Company in the Philippine Islands.

Alexandre Borges, geologist, has been appointed director of the Mines Department of Mozambique in Lourenco Marques, to replace **A. J. de Freitas**, who has retired. Mr. de Freitas has now taken an appointment as managing director of the Empresa Mineira de Alto Ligonha in Mozambique. The company produces columbite, beryl, and semi-precious stones.

HARRY V. WELCH recently returned from Nicaro, Cuba and reported on the progress of private companies as agents of the United States Government in developing the Nicaro nickel deposits. He is shown here as he addressed a recent meeting of the Mining Association of the Southwest in Los Angeles, California. Mr. Welch, chief chemical engineer for the Western Precipitation Company of Los Angeles, told members of the Association about projects for development of Cuban nickel. National Lead Company, Freeport Sulphur Company, and Cuban interests are involved.

James O. McCue, former assistant chief geologist for the Mid-African Exploration Company in French Equatorial Africa, has been appointed manager of Safari Exploration Company's copper exploration program in the Copper Queen and King area in Southern Rhodesia. **E. W. Hunt**, formerly with the O'okiep Copper Company of Cape Province, Union of South Africa, has been appointed consulting engineer for Safari. **M. D. Banghart**, managing director of O'okiep and Tsumeb Corporation Ltd., has recently visited the Safari company's holdings in Southern Rhodesia. He is a director of the Safari firm.

Recent guests of the Colorado School of Mines were eight Yugoslavian mining engineers whose visit to the Golden, Colorado campus was part of a six-week tour of the nation's mining facilities. The tour was sponsored by the Foreign Operations Administration of the United States government. Shown above in a chemistry lab are, left to right: JOHN J. CAPECE, FOA officer in charge of the group; DJORDJE KALCOV, underground manager of the Bor mines; DRAGUTIN MAJER, technical manager of the Bor mines; HANS FROLICH, interpreter; DRAGISA TOMIC, mining manager of the Neresnica mines; MIRKO BIZJAK, mining manager of the Majdanpek mines; MIODRAG CERPERKOVIC, assistant underground manager of the Trepca mines; DRAGO CEH, general manager of the Bor mines; MILAN JOVANOVIC, technical manager of the Trepca mines; and VOJIN STOJSAVLJEVIC, general techhnical manager of the Zajaca mines.

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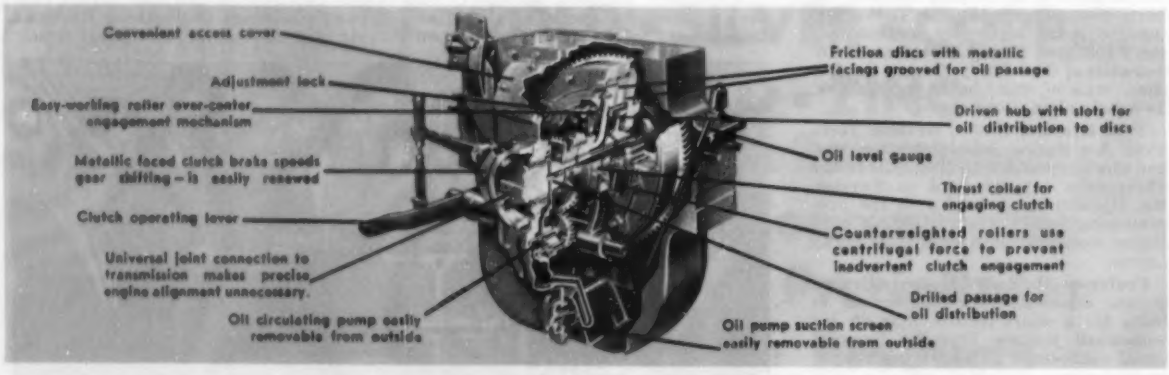
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Two Refining Processes Studied For Bolivian Tin

The Bolivian government is considering the possibilities of constructing a tin smelter in the country to process low-grade concentrates in order to save bagging and freight costs. Preliminary studies have been made by Alex Cornelissen, United Nations member, and Jorge Zalevski of the pyro-metallurgical laboratory of the Banco Minero.

Eugene B. Hotschkiss, vice president of the New Enterprises, Inc. of Massachusetts has been in Bolivia explaining the low temperature selective hydrogen process which he developed for his company. The Hotschkiss process has many apparent advantages. Two factors in its favor for Bolivia are that hydrogen can be generated in the country and the process is supposed to function well at high altitudes. In reducing tin with hydrogen, the reduction of iron oxide present in the roasted concentrate is avoided by adding steam which prevents the formation of the following reaction: $FeO+H_2 \rightleftarrows Fe+H_2O$. The ultimate product of the Hotschkiss process would require electrolytic refining.

Corporacion Minera de Bolivia has engaged the services of a group of German metallurgists to advise on another process based on tin volatisation.

Titanium Operations Start Near Durban, South Africa

Production of titanium minerals has started from deposits at "Ilmenite Hill," Umgababa, near Durban, South Africa. The hill reportedly contains rutile, ilmenite, and zircon. First operations will concentrate on stockpiling and exporting ilmenite. Rutile and zircon will be exported later, according to reports.

On the basis of an annual production of 60,000 tons of ilmenite, 6,000 tons of zircon, and 3,500 tons of rutile, the life of the deposit is estimated at 36 years while the life of potential lower grade material is estimated at 58 years.

In the meantime, a new source of titanium has been reported at Morgan Bay, about 40 miles from East London in eastern Cape Province. A public company to develop it is to be formed soon and the first step will be to establish a processing plant. Samples have been sent to Great Britain, the United States, Australia, Canada, and France for assay. The deposits cover a 2,000-acre area.

Burmese Mawchi Tungsten Mine Freed From Guerrillas

Burmese government forces have liberated the British-owned Mawchi tin and tungsten mines, 150 miles northwest of Rangoon, after being held by guerrilla forces since 1949.

Troops are reported to have found the mines and equipment in good condition, along with two hydroelectric stations and the telephone exchange. The company's staff is said to be well and unharmed.

The rebels did not work the mines during their occupation, but seized the available stockpiled ore and concentrate. Mawchi Mines Ltd. at one time produced 10 percent of the world's wolframite.

Atlas Building Orient's Largest Copper Mill On Cebu In The Philippine Islands

Development of the huge copper deposit at Toledo on Cebu Island in the Philippines has been undertaken by Atlas Consolidated Mining and Development Corporation, of which Colonel Andres Soriano is president. Atlas is a recent consolidation of Masbate Consolidated Mining Company, Antamok Goldfields Mining Company, and IXL Mining Company.

The Toledo copper is a massive low-grade deposit with chalcopyrite and pyrite mineralization in a diorite porpyritic stock where it is in contact with and sometimes intruding an overlying Pandan Series made up of thermally metamorphosed clastic sediments and basic volcanic flows. The ore body has been proven by underground workings and by extensive diamond drilling. Present reserves are estimated at: 6,050,000 tons of positive ore containing 1.3 percent copper and 0.015 ounce gold per ton; 6,800,000 tons of probable ore containing 1.00 percent copper and 0.015 ounce gold.

The ore body occurs along the side of a mountain and mining will consist of removing the 60-foot mantle of low-grade overburden to a leaching site and then benching the main ore body at 30-foot heights. Ore will be loaded by Lorain shovels of 2-cubic-yard capacity into 22-ton Euclid trucks and transported 800 feet to the No. 30 Traylor gyratory primary crusher. Following secondary crushing to a ¾-inch product in two 4-foot Symonds cone crushers, the ore will be conveyed across the Ilag River to the 4,000-ton-daily-capacity flotation mill.

Primary grinding will be by 8 Marcy 86 ball mills in closed circuit with Dorr Duplex DSF classifiers. Each grinding unit will have a Denver "Sub-A" unit cell between the ball mill and classifier to float the coarse sulfides. Classifier overflows will pass through 25-foot Whirlcones to remove oversize which will be reground in one 6- by 10-foot ball mill in closed circuit with a Dorr bowl classifier to minus-48-mesh size.

Place-fix map of the Toledo copper mine.

The combined pulp will be split to four separate flotation circuits, each with one 8-by 8-foot conditioner, followed by seven 56-inch Fagergren flotation machines. A clean copper-pyrite bulk concentrate will be produced; the tailing discarded. The bulk concentrate will be reground in a strong alkaline circuit, and the copper minerals floated out. The tailing from this operation will be a clean pyrite concentrate. The copper concentrate with a grade of 18 to 22 percent will be shipped, in bulk, to Japan, while the pyrite concentrate with a grade of 40 to 45 percent will be disposed of locally or for export for the manufacture of ammonium sulfite or sulfuric acid.

A three-year agreement has been signed with the Mitsubishi Metal Mining Company of Japan for the sale of the copper concentrate. Atlas expects to start shipments during the middle of this year.

Eastern Mining & Metals To Tap Malayan Iron Ore

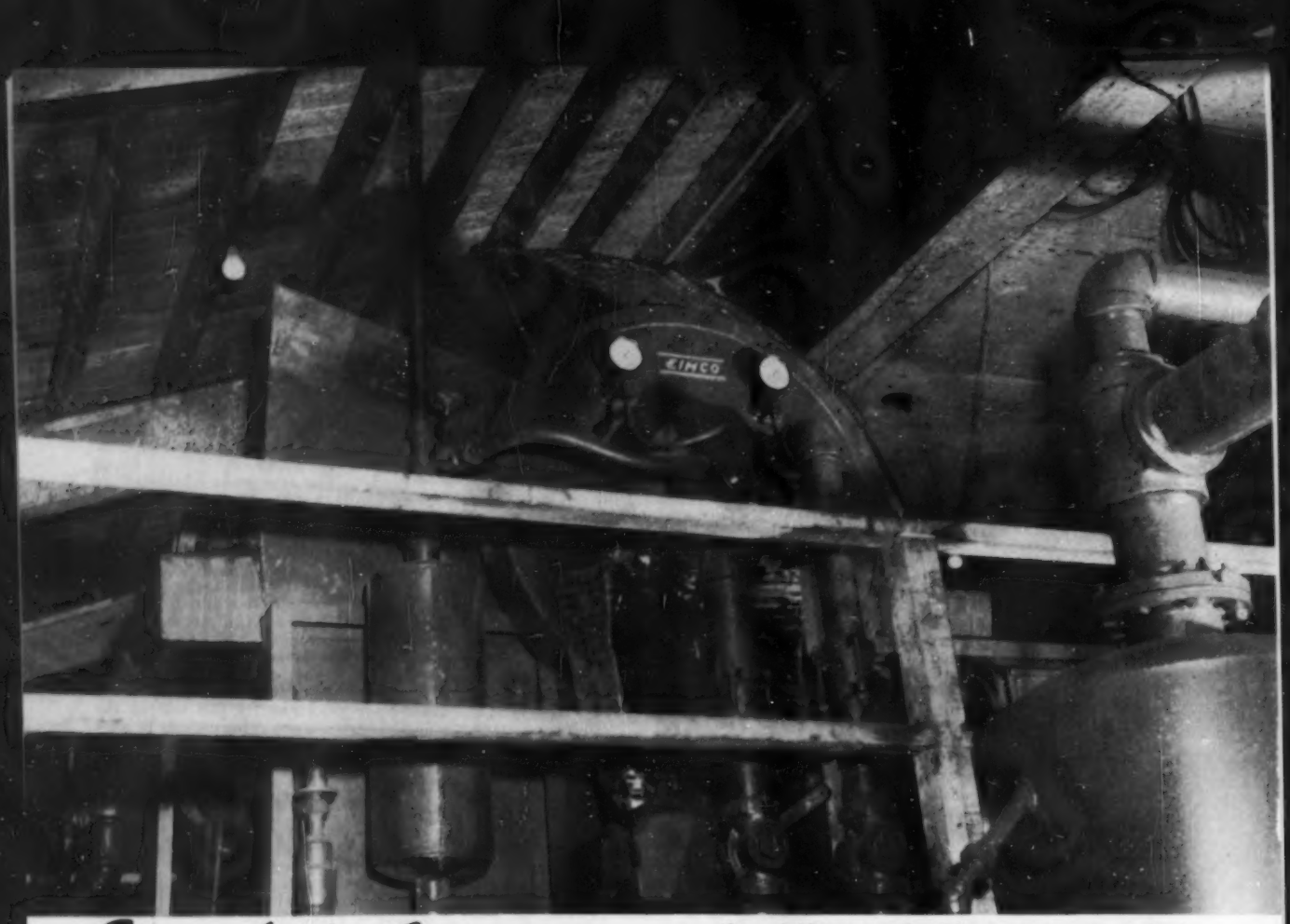
The locally registered and British-owned Eastern Mining and Metals Co. is to undertake Malaya's biggest mining project—a $100,000,000 effort to tap the iron ore deposits in East Pahang, Central Malaya.

Negotiations are going on in London with British banks, among whom are believed to be the Chartered Bank of India, Australia and China and the Hongkong and Shanghai Banking Corporation, for finance on this project. It is not known yet whether the banks are negotiating a loan on their own behalf or on behalf of clients.

The deposits consist of a series of ore bodies as lenses and pockets. It appears that a body of quartz-porphyry was sheared, and then invaded by epidote granite, rich in iron. The iron became concentrated in migrant solutions, which deposited their load in the overlying quartz-porphyry, in locations governed by the shearing, to form hematite-magnetite veins. Outcrops of ore occur up to 100 feet in thickness and 2000 feet in length.

Hematite and magnetite, in varying proportions, form the bulk of the ore. The hematite occurs mostly in the massive form, although there is some specularite present. Analysis of the ore is as follows: Fe 65.70 to 66.60, SiO_2 0.93 to 1.98, TiO_2 0.03 to 0.13, Al_2O_3 0.88 to 1.78, Mn 0.02 to 0.12, P 0.22 to 0.036, S 0.03 to 0.07.

Prospecting has been going on for more than two years and results so far show that more than 25,000,000 tons of high-grade iron ore are deposited in the area between the rivers Jeran and Rampin. The company plans to spend about £3,500,000 on a 50-mile railway from the mine to the sea, and hopes to be in full production and employing 3,000 workers by 1956. The ore will be shipped to Britain, Japan and the United States. Two thousand acres have already been leased and the company hopes to raise this to 9,000 acres.



Above: Agidisc on metallurgical concentrate in New England.

Eimco Agidisc Increases Metallurgical Filtration Efficiency

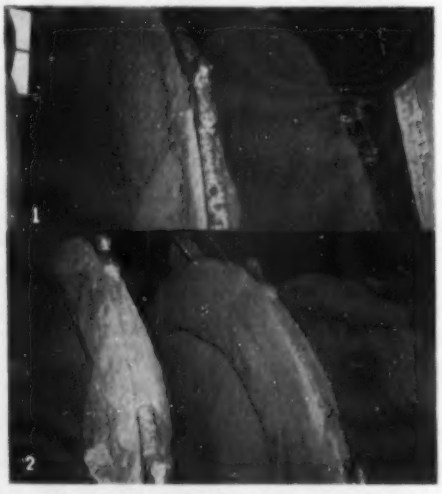
Eimco Agidisc Filters are increasing the production per square foot of filter area in metallurigcal plants.

The Agidisc keeps a fast settling slurry in solution so gently that no eddies are created to disturb the cake formation on the disc. The result of this gentle agitation is a thick even cake over the entire surface of the sector with a resultant uniform drying of the cake, free discharge from the cloth and longer bag life.

Agidisc filters will enable you to realize greater production per square foot of filter area over standard disc design if your slurry contains fast settling particles that settle in the tank. The test of this will be in observation of the operation of your filter. If you see a classification ring as shown in Fig. 2 at right, you are paying the penalty of poor production, high moisture in cake and short bag life.

Eimco has more experience in the design and construction of disc type filters than any other manufacturer. Let us help you with your metallurgical filtration problem.

1. An agidisc filter working on the same feed copper concentrate feed line at the same time as the standard disc. (2) Note classification ring on standard disc. Agidisc delivers 20% more cake with 2% less moisture.



Below: Coal fines filtered on Eimco fitler—note smooth even cake over sectors.

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ALASKA—All agencies in the Nome district are reported to be cooperating in the development of plans to reopen the *Big Hurrah* gold-quartz mine. Three miles of road have been rebuilt by the Alaska Road Commission and the commission plans to keep it open during the winter. The Territorial Department of Aviation plans to build an airfield, a post office will be established, and the Alaska Airlines will fly in mail three times a week. With the cooperation of the Alaska Communications Service, radio communications are being set up. The operating company for the mine is the *Alaskan Associates, Limited* of Portland, Oregon.

ONTARIO—High-grade silver has been found by *Cobalt Consolidated Mining Corporation* on the new 600-foot level of its *Cobalt Lode* mine where drifting has disclosed 60 feet of "excellent" ore on the No. 2 vein south of the shaft. This level appears to be better than the No. 5 and it is probable that an even lower level will be established since this has been the deepest ore yet found in the diabase. In the north section of the mine, a winze was recently put down 40 feet into another ore shoot, and this too will probably be deepened. The former Hellens tailing retreatment plant is being converted to an all-purpose 1,000-ton cyanide mill. Retreatment of tailing has been suspended during this changeover. The company's Colonial mill has been sold; the Cobalt Lode mill is continuing to treat about 250 tons of cobalt and silver ores daily until the new central plant is ready for operation in the spring.

QUEBEC—Work is progressing on the collaring of the three-compartment shaft at the Lynx-Gordon Lake operation of *Quebec Nickel Corporation*, 52 miles northwest of Kenora. The shaft, to be bottomed at 300-foot depth initially, is being sunk at a site approximately 200 feet from the main Lynx (Cordon) Lake ore body established by extensive surface diamond drilling. Preparations for winter operation have been made, and actual shaft sinking should begin soon. Surface diamond drilling is continuing to explore in greater detail the westerly ore body.

ALASKA—W. S. Pekovich and Bobby Coughlin are securing patents on 16 claims covering the *Snettisham* iron deposit. Patenting a large group of claims like this is said to be a rare occurrence in Alaska these days. At Camaano Point on Cleveland Peninsula, George Roberts has ceased operations for the winter at his antimony prospect. Working under a DMEA loan, he had sunk a 70-foot shaft and done some drifting before the season ended.

QUEBEC—For the nine months ended September 30, 1953, *Quemont Mining Corporation, Ltd.* reports that 616,324 tons of ore were milled. Estimated net profit after taxes, depreciation, etc., was $3,205,400. Operations were suspended at the property on October 2 because of a strike. The mine is a copper-gold-silver-zinc-pyrite operation in Rouyn township.

QUEBEC—*Eastern Metals Corporation Ltd.* reports that surface hole No. 90, drilled 600 feet beyond the most westerly underground workings in heretofore unexplored ground, has intersected a wide zone containing nickel mineralization at vertical depth of 720 feet. Hole No. 91 is being collared 200 feet farther west. Another diamond drill is being added underground to speed up detailed assessment of the nickel ore body on the 170 and 450 levels. A second level station at approximately 300 feet has now been completed and a crosscut started to cut the nickel ore body at that horizon. An underground hoist is to be installed in the station to permit resumption of shaft sinking in order to open new levels to 1,200 feet.

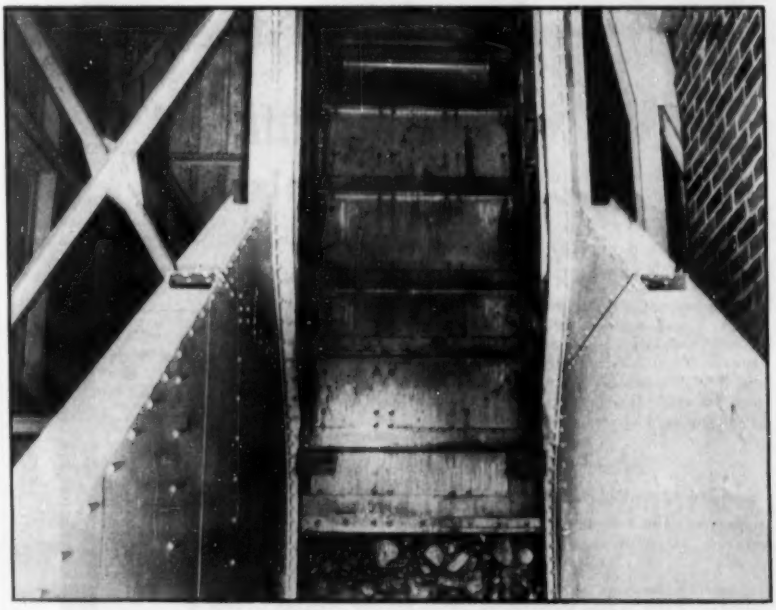
BRITISH COLUMBIA—*Hixon Placer, Inc.* has removed 500,000 cubic yards of overburden from a hogback with hydraulic monitors at its gold placer claims near Hixon. When this hog back is broken through, little, if any, overburden will be left to remove. During the next operating season, changes will be made to increase the pressure of the water delivered by the hydraulic monitors. Sizeable test cleanups are also being planned for the coming season.

MANITOBA—*Sherritt Gordon Mines Ltd.* is tuning up its new 2,000-ton mill at Lynn Lake and hopes to reach full capacity soon. Only the "A" and "El" ore bodies are being prepared for production initially; others will be brought in later. The first carload of concentrates has been shipped over the new 144-mile railroad recently built to serve the Sherritt Gordon operation.

BRITISH COLUMBIA—*Western Tungsten Copper Mines, Ltd.* has been milling about 150 tons of ore daily at its *Red Rose* tungsten concentrator at Hazelton. A record 178 tons was treated in a single day recently. The company is also carrying on exploration work at three groups of claims in New Brunswick.

QUEBEC—*Opawica Explorers Ltd.* is diamond drilling at its seven-claim uranium-columbium prospect in Kensington township. A minimum of 8,000 feet of drilling, mapping, and further prospecting has been recommended on the basis of preliminary work. So far the dike has been opened for about 100 feet and to about 8.0 feet in depth. Higher radioactive indications have been obtained in the bottom of the trench than on the surface. Concentrator tests on a bulk sample have indicated a 78 percent recovery by simple gravity methods. Eschynite, fergusonite, and some uraninite have been identified as the radioactive minerals.

ONTARIO—First nickel concentrate has been produced from the *East Rim Nickel Mines* new 500-ton mill. Initial milling rate is about 350 tons per day. This will be increased to 500 tons nominal capacity after equipment is broken in, and may eventually be increased to 750 tons some time in the future. The mine has been prepared to handle all mill requirements. Ore and waste passes have been completed and known ore bodies are ready for stoping. Conversion from cage hoisting to skip hoisting was completed and the main mining level will be the second



Inco Installs New Mine Hoist and Skips

Canada's highest powered mine hoist, driven by a 6,000-horsepower dual-motor, has been put into operation at one of the new shafts at Frood-Stobie mine of The International Nickel Company of Canada, Ltd. at Copper Cliff, Ontario. Controlled by push button from an operating station underground, the hoist will lift skips, each containing 15 tons of nickel-copper ore, at an average rate of 14,000 tons daily. Installed in conjunction with the hoist are bottom-dump skips being used by Inco for the first time. The photograph above shows a skip in operation. The bottom of the skip is a hinged door which is opened when the skip reaches its dumping position in the headframe of the mine, allowing the nickel-copper ore to drop out. The Kimberly-type skip, used by Inco until now, required that the skip must be tipped to dump the ore. The new skips increase hoisting capacity by reducing the distance of slow travel required in the headframe, thus decreasing the time of the hoisting cycle.

where three stopes have been prepared. J. M. Kilpatrick has been appointed general manager of the operation; A. G. MacKenzie is chief engineer, and John Keeley is mill superintendent.

BRITISH COLUMBIA—*Canadian Exploration, Ltd.* of Salmo is reducing its output of lead and zinc to about 30,000 tons because of low base metal prices and high labor costs. The wholly owned subsidiary of *Placer Development, Ltd.* has been mining about 55,000 tons of ore monthly. Mining operations were reduced to a 40-hour week from 44 hours. Milling capacity is 1,800 tons daily. Production of tungsten at the firm's nearby *Emerald* mine is continuing at a normal rate.

QUEBEC—*Lake Asbestos of Quebec Ltd.* continues to examine the *United Asbestos Corporation Ltd.'s* property under Black Lake, Lake Asbestos, a subsidiary of *American Smelting and Refining Company*, was granted this privilege by United Asbestos a year ago. The company still has not decided whether to develop the property and has been granted additional time by United Asbestos for further tests. A large factor in the final decision will be the amount of capital required to bring the property into production. Several asbestos properties nearby have found the cost of mills and mining plants to be far greater than originally expected.

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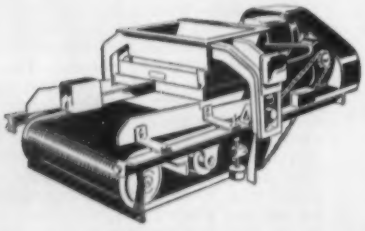

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BRITISH COLUMBIA—*Estella Mines, Ltd.* is negotiating with a major exploration company for cash and shares in a new company in return for an interest in part of its New Brunswick holdings. The new firm would undertake exploration of several of Estella's properties. Estella has dropped an option on the *Little Gem* gold-uranium-cobalt property in the Bridge River district.

YUKON TERRITORY—*Amco Exploration Ltd.* has suspended operations on the base metals prospect of *Mount Keno Mines* in the Keno Hill area after an expenditure of $285,000. Drifting, crosscutting, underground diamond drilling, bulldozing, and other work has been conducted by the *American Metal Company* subsidiary under an exploration program financed and conducted by them. Amco was to have a majority interest in the property if the program proved successful. The agreement has now been ended and Mount Keno retains full ownership. The latter is now making arrangements to mill 1,300 tons of ore stockpiled from a development heading in drifting on the Runer vein.

MALAYA—*Austral Amalgamated Tin, Ltd.* reports that its dredge at Ulu Yam resumed commercial production on November 1, 1953. During October, the firm produced 10 tons of tin-in-concentrate from its operation at Asam Kumbang, and 91 tons from Puchong. Shipments of tin from Malaya in general during October totaled 5,379 tons compared with 4,727 tons in September, bringing the total for the ten months of 1953 to 52,471 tons, compared with 54,421 tons in the same period of 1952.

INDIA—Recent surveys are reported to have disclosed iron ore and bauxite deposits in parts of Rajputana state, particularly in Kalyanpurtaluka of Halar district, and Lakhanka and Ramper villages of Gohilwad district. The government has abolished all royalties in respect of minerals in the former princely states and has now created a new department to coordinate mineral work on a statewide basis.

CYPRUS—Since resumption of shipping in May 1953, *Cyprus Sulphur and Copper Company Ltd.* has shipped over 30,000 tons of high-grade ore from its operation in the Kinousa area. Development work has opened up promising deposits in the Evloimeni Section, about 1¼ miles from Kinousa and 1 mile from the main Limni workings. In the extension of an adit, high-grade copper, zinc, and sulphur ore similar to the Kinousa deposits has been encountered. A geophysical survey is planned for the entire area, followed by drilling to determine the extent and economic value of the Evloimeni ore body, with the hope of finding a possible link with both Kinousa and Limni. The plant being erected at Limni has been completed and should be in production.

MALAYA—Directors of *Kamra Tin Dredging Ltd.* and *Pattani Tin Ltd.* are considering proposals for voluntary liquidation. So far efforts to dispose of the

assets of Kamra have been unsuccessful, and attempts to sell Pattani's assets have been only partly successful. Meanwhile, maintenance and administration charges continue at Pattani.

INDIA—A survey of the Kulu Valley in Punjab has resulted in the discovery of a "lost" silver mine believed to have been operated about 125 years ago. Local residents covered it over when the valley was threatened with invasion and the mine is now under a thick forest. Government geologists believe that the Kulu Valley has silver and lead deposits. They also report the existence of iron but not in commercial quantities.

CEYLON—The first shipment of 30 tons of monazite has been sold to the United States by Ceylon at £125 per ton. Ceylon's entry into the field follows India's ban on export of the mineral which is available in Travancore state. About 100 tons will be ready for sale next June, including 40 tons available for immediate export. The mineral will go to the highest bidder and at present a Dutch firm has offered £200 per ton. The Ceylon government believes it can produce about 1,500 tons annually. There is no stipulation about exports, and no destinational control is exercised by the government, which means that Russia and other countries behind the Iron Curtain can also bid for the material.

INDIA—The estimated ore reserves of the *Indian Copper Corporation Ltd.* have increased by 224,404 short tons, to 3,448,795 short tons. Reserves at both the *Badia* and *Dhobani* mines have decreased, while the *Mosaboni* mine, where development results continue to be satisfactory, has more than made up the deficiency. Main development work for ore reserves is at the North Bhadia Section of the Mosaboni mine; however, development in depth of this comparatively new ore shoot has now caught up with the old Mosaboni mine, and further reserves can only be opened by making the mine deeper.

MOZAMBIQUE—A new strike of amphibole asbestos was made at Mavita in the Vila de Manica district, close to the Southern Rhodesian border. The ore bodies appear to be lenticular, but exposures indicate a probable strike length over a few miles. Several claims have been pegged there by local farmers, and a 5-ton sample of hand-cobbed ore met the approval of buyers. Negotiations are being conducted with a South African asbestos group for exploration of these deposits.

SOUTH AFRICA—*West Driefontein Gold Mining Company Ltd.*, one of the 22 gold mines in the Union designated as uranium producers, is now extending its shaft sinking program. A new shaft, No. 5, is to be sunk 5,000 feet south of No. 2 to serve the deeper levels of the rich western sections of the mine. At the site of the proposed No. 5 shaft, the lower formations of the Pretoria Series form a cover of about 150 feet over the dolomites. This cover may have prevented leaching and the formations of caverns in the upper dolomites. It is therefore possible that sinking through the dolomites may prove less costly than otherwise would have been the case. It has also been decided to resume sinking No. 4 shaft, the most easterly, at a restricted rate. Sinking operations in this shaft were suspended in 1949 in order to conserve capital funds. With production now well under way, this is no longer necessary. Nos. 1 and 2 shafts serve the upper levels of the western sections, and Nos. 3 and 4 will serve the central and eastern sections. The policy of providing mill capacity ahead of requirements is being maintained. So far three mill units have been installed, and the fourth will have been completed early next year, according to present expectations. Each of these units has a capacity of 25,000 tons per month, and consists of a primary ball mill and two secondary pebble mills. Eventually the mill will comprise five of these units, giving a capacity of 125,000 tons per month. The current milling rate is about 45,000 tons monthly, and this will be built up to the mill capacity as sufficient stope faces are prepared. Payability has been running at the rate of 100 percent in development. Situated as it is in an area where underground water is above the average, pumping capacity is important. This is being increased to 12,500,000 gallons per day in order to ensure that as the lower levels of No. 2 shaft are opened up there will be adequate pumping arrangements available.

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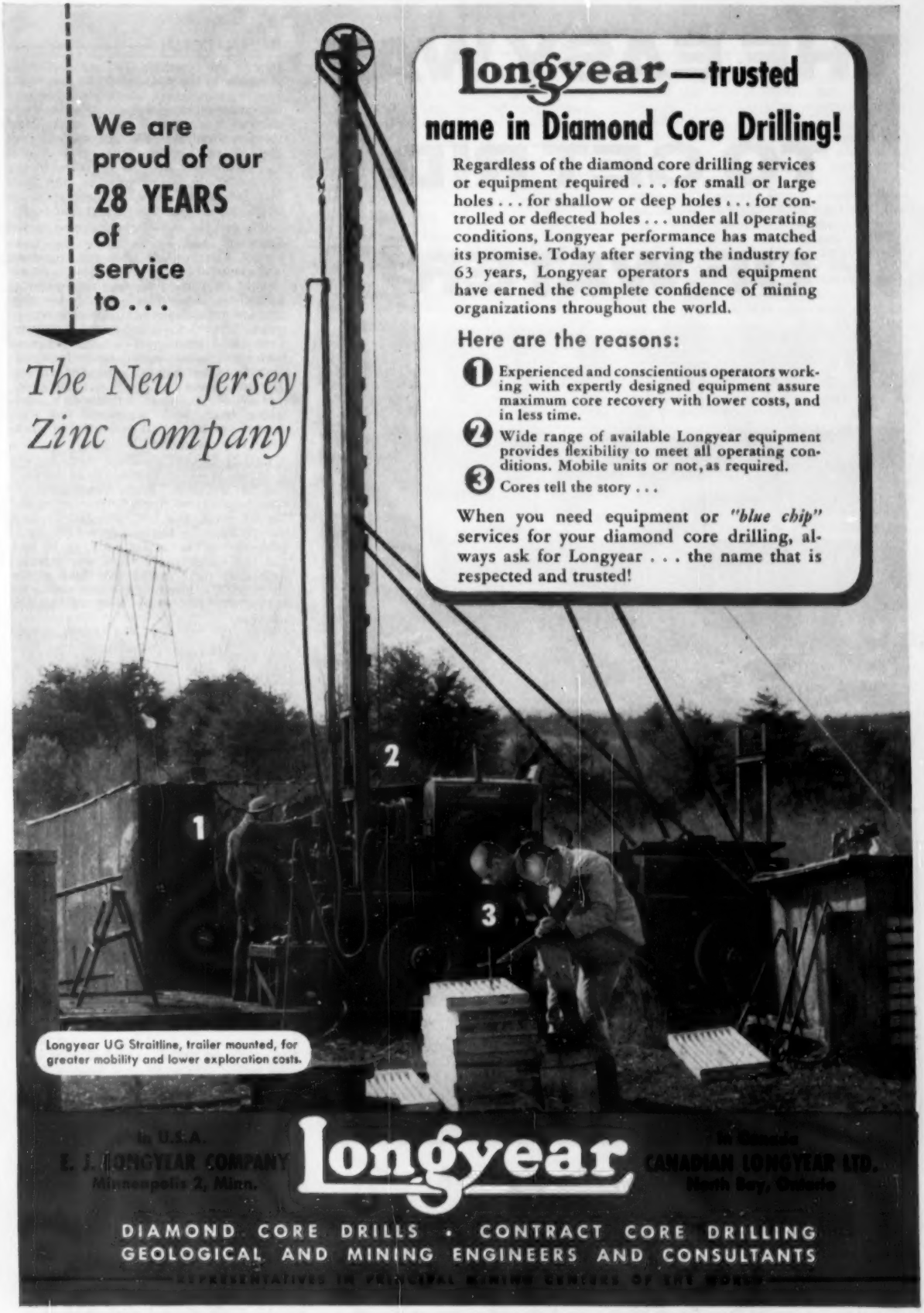
INTERNATIONAL

GOLD COAST—*Taquah and Abosso Mines Ltd.* has asked the Gold Coast government for financial assistance so that development may be carried on in a richer and more promising area of the mine. At present the company is mining higher grade sections of the existing ore reserves, but there is insufficient development work to replace the ore extracted. Estimated costs of new development would be £25,000 to £30,000 spread over a period of 12 months. Such a plan would replace about half the amount of ore extracted in that period, would contribute to the life of the mine, and would help pave the way for future development work later if it proved advisable. The government is reported to have agreed to this plan, although not yet officially. The company would pay a redemption charge of 5 shillings per ton on treatment of any ore developed by this work. The outstanding balance would be repaid at 4 percent interest, and if operations cease the government would select and take over, at an independent valuation, enough of the company's housing accommodations at Abosso to satisfy the balance.

TANGANYIKA—*Uruwira Minerals, Ltd.* has obtained additional funds amounting to £120,000 from the Tanganyika government for the purpose of completing a pipe line required for a water supply from the Ugalla River. Conditions of the loan are that a government representative will be elected to the company board, and that the government will obtain a fee for the pipe line until the loan is repaid. During the first six months of the company's current year, production of concentrate increased. A total of 3,018 dry tons of average grade were produced. Fortunately, prices realized were higher than estimated; thus the money still needed before production from the new mill will start is £200,000, about half of what was needed a short time ago. According to latest estimates, ore reserves amount to 3,000,000 tons excluding any ore which might be found 20 meters below the No. 6 level. During the year ended March 31, 1953, the firm produced 3,791 metric tons of concentrate containing 55.3 percent lead, 8.20 percent copper, 1,055 grams silver, and 21.1 grams gold per ton. Contained metals were lead 2,099 tons, copper 310 tons, silver 3,999 kilograms, gold 80,320 grams.

SOUTHERN RHODESIA—*Rhodesian Alloys Ltd.*, a joint company formed by *John Brown & Co., Ltd.*, the *British South Africa Company*, and the *Rhodesian Anglo-American Corporation*, has started production of ferro-chrome at Gwelo. The chrome ore is supplied by the *Rhodesia Chrome Mines Ltd.* from its new heavy-media separation plant at Selukwe, and, to a lesser degree, from the *Windsor* mine at Que Que. Since the operation of this plant has proved highly successful, and in view of the large production of chrome ore in the country, it is expected that more plants will be erected in the near future.

SOUTH AFRICA—*African Mining and Trust Company Ltd.*, subsidiary of *Associated Ore and Metal Corporation*, has been and still is conducting drilling operations for tin on the farm Mutue Fides 422 with some encouraging results. The company owns surface and certain mineral rights, including tin, on the above farm and portions of the farm Vlakfontein 409, all situated in the Potgietersrust dis-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trict in the Northern Transvaal. Another company of the Associated Ore and Metal Corporation group, *Associated Asbestos Ltd.*, owns claims extending over 4,426 morgen and mining rights over 1,002 morgen situated in the asbestos belt near Pietersburg, Northern Transvaal, as well as options over additional claims in the same area. In the year ended 30th June 1953, about £27,000 had been spent on development, buildings, plant and equipment; and the initial development of the *Beesthoek* and *Tubex* mines was completed. The erection of a new crushing and extraction plant may become necessary at an early date for more efficient operations. This plant would be constructed principally from existing equipment. Another associated company, *Transvaal Corundum Co. Ltd.*, is having tests overseas conducted on grain corundum from its deposits near Pietersburg. The tests have not yet been completed; meanwhile, the plant remains on a caretaking basis, with occasional test runs carried out and small quantities of grain corundum dispatched.

GOLD COAST—*Bibiani, Ltd.* reports improved development results at the bottom of its mine. Four more crosscuts have been driven through the reef on the No. 19 level, the last two—No. 11 and No. 12 East—having averaged 21.5 dwts. gold per ton over a reef width of 15 feet and 17.9 dwts. over 10 feet, respectively. Estimated total profits for the quarter are £26,721, bringing the year's total to £135,060, compared with £155,398 last year.

SOUTH WEST AFRICA—*South African Minerals Corporation Ltd.* reports that output of manganese ore was considerably increased during the five-month period ended October 30, 1953 because of increased mechanization. However, the shortage of native labor restricted tonnage shipped. Steps are being taken to remedy this labor situation, and also to install mechanical sorting aids. Inadequate rail facilities limited shipments of chrome ore from the company's mine near Rustenburg, Transvaal, during the quarter ended September 30, 1953. Facilities have now been increased and shipments are higher.

SOUTH AFRICA—Because the potential production of metallic tin in South Africa is now in excess of the country's requirements, the Controller of Non-Ferrous Metals has granted permission to *Rooiberg Minerals Development Company Ltd.* to export a portion of its tin concentrate for a somewhat lower return than if the concentrate were sold to local smelters. In August 1953, five additional stamps were commissioned to increase the milling capacity, and the full effect is becoming apparent. In the year ended 30th June 1953, 50,346 short tons of mine ore were milled with an average head of 1.88 percent tin; the recovery was 83.27 percent. Including the output of the rough concentrator, 55.66 long tons of concentrates, total production amounted to 1,131 long tons of concentrates averaging 65.46 percent metallic tin. These results reflected improvements on the previous year. Of the 20,065 feet of total development, 11,764 were sampled and 7,656 proved payable averaging 3.01 percent tin; this reflected an improvement of 46 percent in total development footage. Ore reserves at 30th June 1953 were estimated at 147,775 short tons averaging 1.66 percent tin; which were also substantially higher than at June end, 1952. In the quarter ended 30th September

this year, 14,675 short tons of mine ore were treated. Total recovery, including output from the rough concentrator, amounted to 396 long tons of concentrates averaging 67.53 percent tin.

SOUTH WEST AFRICA—*Lorelei Copper Mines Ltd.* has acquired 310 base mineral claims in the Luderitz district, equivalent to 22 square miles. In addition, the company has been granted protection against pegging in a large area surrounding these claims. Previously prospected as far back as 1929, the claims were more recently covered by extensive geophysical surveys, and, in the last year, drilling disclosed the occurrence of primary copper-bearing granodiorite over an appreciable area. The copper is in the form of chalcopyrite. Drilling operations are being continued, and a 100-ton-per-day pilot flotation plant is to be installed to provide data on the most suitable recovery methods.

EUROPE

EIRE—*Silvermines Lead & Zinc Company Ltd.* has decided to increase its 400-ton-per-day mill to 800 tons because of a sharp increase in ore reserves. Reserves were recently re-estimated as follows: proven ore, 540,000 tons averaging 2.11 percent lead; partly proven ore, 570,000 tons averaging 1.97 percent lead; indicated ore, 350,000 tons containing approximately 2.0 percent lead. In March 1953, ore reserves were estimated at only 206,634 tons. A diamond drilling program which is still in progress has accounted for most of the increase. No further crushing, milling, or flotation plant will be required but to extract this tonnage considerably more development work will have to be undertaken. To complete the development program, further capital will be needed.

PORTUGAL—*Beralt Tin & Wolfram Ltd.*, which owns the *Panasequeira* mine in the province of Beira Beaxa, reports that the price of its wolframite has fallen from £28 per unit to £13. The company has spent £80,000 in expanding the Panasequeira mill and making additions to the River mill. Two English Electric Diesel generating sets are being installed in the River mill and it is being converted from d.c. to a.c. electric power. G. A. Smith, general manager of the mine, has been appointed a director of Beralt.

YUGOSLAVIA—A new flotation plant is in operation at the *Suplja Stena* lead-zinc mine at Montenegro, 30 kilometers northeast of Plevlje. The plant is expected to have an annual capacity of 10,000 tons of zinc concentrate and 4,000 to 5,000 tons of lead concentrate. The mine produces about 250 tons of ore daily, containing 10 to 11 percent zinc and 5 to 7 percent lead. The pyrite section of the plant has not yet been completed. In Serbia, the *Lece* lead-zinc mine has been reopened, and a flotation and cyanide plant with a daily capacity of 250 tons has been installed. The ore contains some gold.

BELGIUM—The *Societe General des Minerais* has started exploration by drilling on the famous old *Bleiberg* and *Moresnet* lead-zinc concessions. The country has had no active metal mining since 1946 when the last pyrite-lead-zinc mine (Vedrin) closed down.

RUSSIA—According to a London report, a 9,000-ton vessel is on its way to Britain with the first shipment of Russian manganese ore since before the war. The ship is said to have been loaded at a port in the Black Sea.

YUGOSLAVIA—Two blast furnaces are being erected at Skopje, Macedonia. Each will have an iron output of 600 tons per day. Steel furnaces and sheet rolling plants will also be built at the same place, making one large iron works.

NORWAY—Ulf Styren, managing director of *Norsk Jernverk A/S*, reports that production at the iron and steel plant now being built at *Mo i Rana* in northern Norway, will start in the fall of this year. "This means a delay of about one year compared with the original plans," he said. He gave as a reason for the delay the difficulties that have been met in the construction of the *Rossaga* hydroelectric plant which is to supply power for the steel operation. The Mo i Rana plant will be an integrated unit processing local ore into rolled steel products. It will be Norway's first big steel plant, with an initial output of about 200,000 tons of rolled steel products per year. Norway's import of rolled steel products was 235,000 tons in 1950, 325,000 tons in 1951, and 337,000 tons in 1952.

RUSSIA—The Communist party newspaper, Pravda, reports that Russia's steel output for 1953 would exceed 38,000 000 metric tons, more than double the 1940 figure. Certain plants were criticized for failing to "keep pace with the demands of the national economy." Last year's estimates on Russian steel output were 35,000,000 metric tons. Russia's goal for 1955 is considered to be about 45,000,000 metric tons.

SWEDEN—Swedish iron ore exports during the first three quarters of 1953 totalled 11,300,000 tons, compared with 11,930,000 last year.

RUSSIA—A seventh aluminum reduction plant is reportedly being erected in Russian Armenia. Planned capacity is 83,000 metric tons per year, about the same as the present largest plant in Russia, located at Kamensk in the Urals. Before World War II, Russia produced about 81,000 tons of aluminum annually. This dropped to 68,000 tons in 1943. Under the current Five-Year Plan, 1955 production will reach 545,000,000 tons. Known bauxite reserves in Russia are reported at 33,000,000 tons, with an average alumina content of 35 to 45 percent. Largest bauxite reserves in the Eastern bloc are in Hungary where they total 275,000,000 tons.

POLAND—The Polish Ministry of Mining has ordered the reactivation of the Lower Silesian copper mines of the former German *Berg und Huetten A.G.*, a subsidiary of the *G. Giesche's Erben Mining Company*. To process the copper ore mined in this area, which since 1945 has been Polish territory, the *Konrad* combine in Boleswiec will receive machinery. Located near the combine is a copper mine which was a part of a German company prior to 1945; it will be enlarged.

NORWAY—Despite a serious accident in the mines at Longyear City, delivery of coal from *Spitsbergen* was satisfactory during the summer season. Of 400,000 tons of coal shipped from Spitsbergen last year, about 130,000 tons were exported to Denmark, Sweden, and Germany, with the remainder used in Norway. The last shipment before ice blocked all sea transportation arrived in Norway in November. Most of the damage in Longyear City has now been repaired.

AUSTRIA—September production of ores and minerals in Austria were: 233,490 metric tons iron ore, 13,963 tons

Rosario Depleting Silver Reserves

The famous Rosario mine of the New York and Honduras Rosario Mining Company which has been mined for silver and gold for over 200 years is now reported to be operating on the last of its reserves. Above is an over-all view of the property showing the mine, mill, and cyanide tanks located on the steep hillside. The company holds about 30 square miles at San Juancito, about 20 miles from Tegucigalpa, Honduras in Central America, and also operates the El Mochito silver-lead property in the Department of Santa Barbara, Honduras. Its wholly owned subsidiary, New York and El Salvador Mining Company, Inc., operates the El Dorado gold mine in the District of Cabanas, Republic of El Salvador.

copper ore, 8,796 tons lead-zinc ore, 871 tons antimony, 1,808 tons bauxite, 21,077 tons kaolin, and 7,121 tons quartzite.

YUGOSLAVIA—According to decree Sluzbeni List FVRJ No. 41, issued on October 14, 1953, exports of iron ore, pig iron, and scrap iron are prohibited. In the international group of goods No. 115, the following are also prohibited from export: aluminum in blocks, aluminum alloy, aluminum in melted condition, ferro-molybdenum brass, scrap brass, scrap copper, calcium-molybdate, rolled copper goods, rolled copper alloys, forged copper goods and alloys.

AUSTRIA—The magnesite industry reached an all-time high in monthly production during September 1953 when a total of 76,462 metric tons were mined.

CZECHOSLOVAKIA—Mining operations reportedly started at an iron ore deposit near Plzen in late October. The ore, with a low iron content, is being mined near Ejpovice, east of Plzen. Another mine reportedly in operation is the open-pit in the Klabata River valley where Klano Iron and Steel Works is mining a hematite deposit.

MEXICO—The *Los Alamos* property near Alamos, Sonora, is being developed for tungsten and cobalt by Pedro Echeverria V., owner of the property, and the *Ventures Ltd.* subsidiary, *Consolidated Guayana Mines Ltd.*

COLOMBIA—During the nine months ended September 30, *Amazu Gold Dredging, Limited* dredged 4,568,100 yards to produce 10,521 ounces of fine gold. This compared with 5,089,300 yards dredged during the same period of 1952 to recover 14,569 ounces. The yardage for 1953 includes 979,000 cubic yards of 1.29 cent ground handled by No. 2 dredge in digging flotation towards the dismantling site. Regular value per yard in 1953 was 8.06 cents and 10.2 cents in 1952. During the same nine-month period of 1953, *Pato Consolidated Gold Dredging, Limited* dredged 14,338,300 yards to recover 144,321 ounces of fine gold. In the same period of 1952, the company dredged 14,550,800 yards to recover 127,068 ounces. Value per yard in 1953 was 35.20 cents and 30.56 cents in 1952.

MEXICO—Lower prices and less demand are reported to be affecting the tungsten mining industry so drastically that unless the situation improves there may be many suspensions of work and a few mine closures. This is the warning of Enrique Casas Alatriste, executive vice president of the Federation of Small Miners associations. He cites Guanajuato, Durango, Sinaloa, Chihuahua, and Oaxaca as particular distress areas. Pleas are being made to the federal government for aid for tungsten mining.

ARGENTINA—The *Campana Mahuida* lead mine in Neuguen Territory is one of the principal mining undertakings in the country. This mine has three main veins with average widths of 0.35 meters, 0.67 meters, and 0.52 meters. Average grades are 21.23 percent lead, 1.15 percent zinc, and 592.7 grams per ton silver; 20.28 percent lead, 4.54 percent zinc, and 1,002.69 grams per ton silver; and 13.5 percent lead, 5.0 percent zinc, and 350 grams per ton silver, respectively. Estimated ore reserves in these veins are set at 5,500 tons. An aerial tram carries the ore to the concentrating plant from the mine. The plant is composed of a jaw crusher, ball mill, trommel, two shaking tables, and jigs, treating three tons of ore daily. This is to be enlarged to 20 tons per day.

MEXICO—The Mining Stimulation Commission, part of the Ministry of National Economy, is seeking to interest Mexican mining men with sufficient capital in development of mines in Nueva Luz, Valencia, San Cayetano de la Ovejera, San Pedro Gilmonene, Guadalupe, and the Guanajuato City sector. Mostly silver producers, they are said to be some of Mexico's richest mines and recent inspection indicated that they are good working prospects. Some were closed 25 to 30 years ago because of insufficient capital to continue operations.

NICARAGUA—*Tonopah Mining Co.* of Nevada is seeking permission of the SEC (Securities Exchange Commission) in the United States to sell its 40 percent interest in *Tonopah Nicaragua Co.* to *Mines, Inc.* The latter firm owns 60 percent of Tonopah Nicaragua Co. and is planning to invest between $6,000,000 and $8,000,000 in development of the *Rosita* copper-gold-silver mine in northern Nicaragua. Tonopah Mining does not wish to participate in the development work and therefore is seeking an exemption from the SEC to enable it to sell. The price involved is $65,000 cash and 10,000 shares in *Falconbridge Nickel Mines, Ltd.*, a Canadian firm.

MEXICO—The Bank of Mexico announces that during the first 10 months of 1953, 3,853,000 ounces of silver were shipped to Germany and 2,017,000 ounces went to France. Private concerns in both countries were the purchasers and the silver is intended for industrial purposes, not for minting, says the Bank. Mexican silver production for 1953 is expected to total 45,000,000 fine ounces.

ARGENTINA—A recent study of the lead mining industry in the country has been prepared. Galena and cerussite are reported as the two principal minerals extracted, the last on a small scale. Lead smelting and refining are conducted in four plants—Puerto Vilelas (Presidente Peron Province) with the largest capacity, La Tablada, Mercedes, and Avellaneda (Buenos Aires Province). Copper matte, antimonial lead, and metallic silver are the byproducts. In the Puerto Vilelas plant, lead is produced in ingot form with a grade of 99.98 percent, and also as "chemical type" for use in some industries.

BOLIVIA—The small miner is having increasing difficulty in surviving because of the gradual depreciation of the Bolivian currency. For some time the authorized free market value of the United States dollar was stabilized at 709 bolivianos for buying United States currency and 720 bolivianos for selling. This was during the period that the *Banco Minero* was selling gold certificates valued at $120,000. Now that these sales have been

DIG DEEP . . . LIFT . . . AND CARRY FAR

Tri-State Zinc Mine uses Sauerman Slackline Cableway for open pit mining.

Scraper bucket returning to pit where it is digging 200 cu. yds. per hour

How Sauerman Machines Cut Costs

With one man at the controls, a Sauerman Scraper or Slackline Cableway can reach out 1,000 ft. or more and dig, haul and dump ore, sand, gravel or any bulk material. Simple operation! Manpower economy!

A Sauerman machine can be installed to reach across a pit, pond, river or stockpile, or up to the top of a hill. It moves material rapidly anywhere within its wide radius. Flexible for varied ground conditions. Costs only a few cents per cubic yard handled. Gas, electric or diesel. Scraper sizes: 1/3 to 15 cu. yds. Slack lines: 1/3 to 3½ cu. yds.

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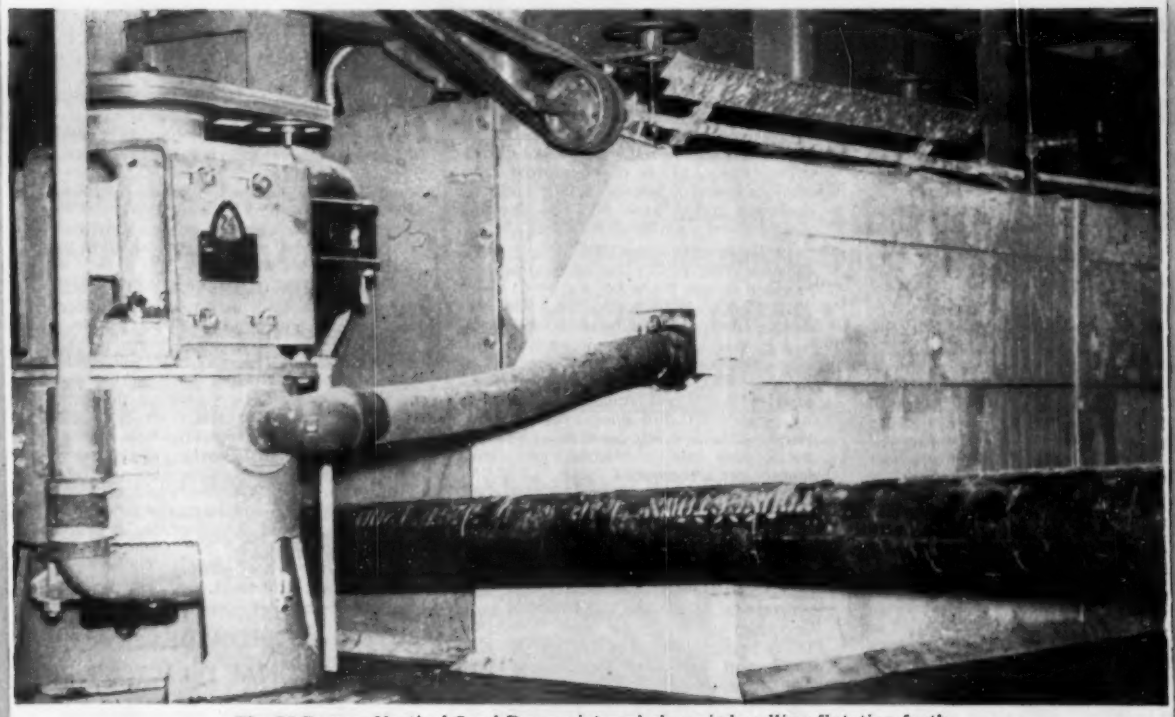
Complete Milling Equipment – from testing, to feeder, to dryer!



The 2" Denver Vertical Sand Pump pictured above is handling flotation froth direct from the launder—without a sump and with minimum spray water.

You Can Easily Handle Abrasive And Frothy Pulps With A Denver Vertical Centrifugal Sand Pump

Increase your production and eliminate expensive pump trouble with Denver Vertical Sand Pumps for your difficult pulp handling.

These Denver Vertical Pumps easily handle flotation concentrates, middlings or other frothy pulps...granular gravity concentrates and fluctuating middling flows. In fact, the Denver Vertical Sand Pumps will handle any —¼" feed that will flow by gravity.

NO PACKING GLAND

The Denver Vertical Sand Pump design eliminates the trouble spots found in most sand pumps. One of these engineered features is the elimination of any packing gland or sealing water.

Since the feed pulp flows by gravity into the pump bowl and through to the feed opening on the top of the runner, there is no need for troublesome packing around the shaft. The large cast iron pump bowl also serves as a feed chamber, eliminating a sump or feed box.

HANDLES FROTHY PULPS

A vortex is created in the feed bowl by the action of the runner in the bottom. This vortex action also prevents stalling or plugging from pulps containing sands or coarse materials.

SELF-PRIMING, NON SURGING

With the feed bowl over the runner, no priming is necessary as any feed to the pump flows by gravity into the runner intake opening.

The Denver vertical design places the runner case in a horizontal plane and makes it impossible for the surging common to ordinary sand pumps when operated below capacity or on intermittent or fluctuating feed flows.

Sizes: ¾" to 4", capacities to 400 g.p.m. @ 25% solids. Many sizes are in stock.

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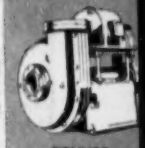
DENVER VERTICAL PUMP



DENVER SRL PUMP

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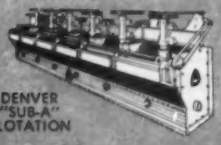
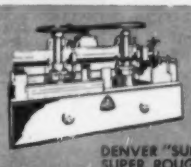


DENVER "SUB-A" FLOTATION



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DENVER DIAPHRAGM PUMPS

DENVER DILLON SCREEN

concluded, the dollar rate is rising and one can easily obtain 750 bolivianos for selling a United States dollar, thereby deflating the value of the boliviano.

NORTHERN TERRITORY—Uranium fever remains paramount. *Poseidon N.L* has secured an option over a uranium reserve of five square miles in the Edith River area. Ore is claimed to be of the type required by the Atomic Energy Commission. At Brocks Creek near Adelaide River, *Territory Uranium Syndicate* has discovered a uranium field. A 40-acre lease has been pegged and a discovery reward applied for. *Doria Gold Mines* and *Territory Scheelite* are partners of Territory Uranium. On the Arunta gold field *Uranium Development and Prospecting N.L.* has an option over a uranium prospecting area of five square miles, while in the Edith River district *Uranium Mines N.L.* holds options. Prospecting on the latter claims is under the technical supervision of H. J. C. Connolly.

PHILIPPINE ISLANDS—The new iron and steel plant being erected for *N. A. S. S. Co.* at Ilagan, Lanao, is expected to begin operation later this year, along with new rolling mills. The Ilagan plant with its 10-ton electric furnace will have an initial capacity of 20,000 tons annually, and will be the first large-scale steel mill to operate in the Philippines.

TASMANIA—For the year ended October 30, 1953, *King Island Scheelite (1947) Ltd.* produced concentrates valued at £A1,920,000, compared with £A1,704,935 in the previous year. Ore milled was 220,188 tons to yield 1,289 tons of concentrate. At Queenstown, *Mount Lyell Mining and Railway Co. Ltd.* treated more ore in the year ended September 30, 1953, but recovered less metal. Ore mined was 1,472,140 tons with a recovery of 8,648 tons of copper, 5,502 ounces of gold, and 25,546 ounces of silver.

NEW ZEALAND—*Clutha River Gold Dredging, Ltd.* has filed a claim with the government for compensation for loss of its mining rights in the Clutha River. The company was originally formed to dredge an area extending for 19 miles on the Clutha River from Alexandra Bridge to Coal Creek. After dredging about three miles of the area, it was decided to transfer the dredge to the Alexandra and Earnscleugh Flats where test boring had been satisfactory. In recent years, however, the government has decided to build a large power project at the lower end of the company's river claims which, when completed, will innudate the claims and make them unworkable. The case is now going to arbitration. As of March 1953, the remaining workable area at the Earnscleugh Flats was 361 acres. Operating results for the year ended March 31, 1953 were: 2,976,000 cubic yards dredged to recover 6,719 ounces (1.08 grains per cubic yard).

NEW SOUTH WALES—*North Broken Hill Ltd.* treated 351,749 tons in the year ended June 30, 1953, producing 65,705 tons of lead concentrate and 66,308 tons of zinc concentrate. Corresponding figures for *Broken Hill South Ltd.* were 297,947 tons of ore, to produce 36,100 tons of lead concentrate and 31,962 tons of zinc concentrate. *Lake George Mining Corporation Ltd.*, for which *Lake George Mines Pty. Ltd.* is the operating company, showed a loss of £ Stg 9,099 for the year ended June 30. The previous year showed a profit of £ Stg 389,727.

PHILIPPINE ISLANDS—For the fiscal year 1952-1953 value of total mineral production was Pesos 147,841,891. About 35 per cent of this came from the gold mining industry; 42 percent from the base metals; and the remainder from production of nonmetallics. Volume was as follows: 490,520 ounces of gold, compared with 423,269 ounces in the preceding period; 651,334 ounces silver, compared with 384,549 ounces; 1,767,529 metric tons iron, chromium, and manganese ore, compared with 1,553,658 metric tons; 16,866 metric tons copper, lead, and zinc, compared with 15,013 metric tons.

SOUTH AUSTRALIA—The State Government will spend £A3,096,000 during the 1953-1954 fiscal year on uranium projects—i.e., *Radium Hill* mine and Port Pirie chemical treatment plant. £2,318,000 is being made available by the Export-Import Bank and the British Ministry of Supply.

SOLOMON ISLANDS—As a result of previous reports, another field expedition is now re-examining one of the properties over which London Tin Corporation has obtained a prospecting license. Local reports state that geological surveys are being carried out on the islands and that some manganese deposits may shortly be opened up. It is not known whether London Tin is concerned with the latter developments.

WESTERN AUSTRALIA—*Norseman Gold Mines N.L.* is treating monthly tonnages about as follows: flotation ore 6,800, selected ore 1,100, total sulphur content 1,950 tons. The company continues to mine only pyritic ore but may resume gold-bearing ores if a price increase occurs or if new discoveries are made.

INDONESIA—During the month of October 1953, the production of tin-in-concentrates in Indonesia totaled 3,076 long tons of fine tin. This was supplied by the three mining firms: *Perusahaan Negara Tambang Timah Bangka* 2,103 long tons; *N.V. Billiton Maatschappij* 746 long tons; and *N.V. Singkep Tin Exploitatie Maatschappij* 227 long tons. For the period from January through October production was as follows: Bangka 17,409 long tons; Billiton and Singkep 10,427 long tons.

QUEENSLAND—*Mount Isa Mines* Ltd. for the year ended June 30, 1953 treated 641,520 tons of lead-zinc ore and 206,380 tons of copper ore. Produced from this were 3,195,374 ounces of silver, 38,536 tons of lead, 21,413 tons of zinc, 5,477 tons of blister copper, and 576 tons of copper in dross. At Cracow, *Golden Plateau N.L.* reports that for the year ended June 30, the company crushed 23,181 tons (an increase of 2,695) to recover 11,384 ounces of gold (an increase of 2,110 ounces). The grade was 10.49 dwts, an increase of 1.44.

PHILIPPINE ISLANDS—*Atok-Big Wedge Mining Company* has suspended all mining operations at its gold property in the Baguio mining district. A crew will be kept to maintain and guard the property.

WESTERN AUSTRALIA—*Northwest Tantalum N.L.* has been formed to mine for tantalum, columbium, beryllium, and other rare metals on claims at Wodgina, Tabba Tabba, Strelley, and other places in Western Australia previously operated by *Tantalite Ltd.* The company plans to begin work on its mines immediately and directors expect continuous production to start within six months.

NORTHERN TERRITORY—Two additional important areas of radioactive ore have been found at Rum Jungle—one at Mount Fitch, eight miles north; the other at Rum Jungle Creek, two miles west. Seven bulldozers are working up to 60 hours weekly to uncover deposits found by ground or aerial surveys. 225 men are working on construction of the treatment plant for *Territory Enterprises Ltd.* Production of uranium salts may begin here in July 1954. It is expected that imported sulphur will be used on the site for sulphuric acid manufacture, at least in the beginning. Ore has already been exported from Rum Jungle.

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(*Continued from page 47*)

involuntary power stoppages when working to full capacity and under heavy loads has lost its terrors; there is no rush to open release valves, no accumulation of partly crushed products on floors and in sumps to be returned to the circuit later, thus causing a reduction in new feed until these accumulations have been dealt with. When the weekly shutdown is called for, dropping the load can be done in a few minutes compared with three to four hours required for conventional classifiers. The starting-up is equally facilitated. Actual adjustments can be made in a very short time under skilled supervision, instead of being left to operators who very frequently have had insufficient training. As already pointed out, capital costs are but a very small fraction of those involved in the erection of conventional classifiers. From the point of view of safety first, since there are no moving parts in a cyclone, the possibility of accidents is greatly reduced if not entirely eliminated.

Forward Metallurgical Step

It is the considered opinion of most metallurgists that cyclones as applied to grinding circuits in gold recovery plants** on the South African goldfields have come to stay, and that their introduction is a very big step forward in gold metallurgy. From the point of view of operating costs, they have everything in their favor. Much in the way of basic investigation remains to be done and this work will engage the attention of skilled technicians throughout the mining and metallurgical world for many years to come. As a result of their painstaking and efficient work, it may be asserted with every confidence that present performances, which are good, will be ultimately improved upon considerably.

The tabulated results represent in all cases the average over a large number of tests. The variations which occurred were no more marked with the cyclone installations than they were with the conventional classifiers.

** Other companies installing cyclones in their mills include Western Holdings Ltd. at Odendaalsrus, Orange Free State, Daggafontein Mines, Ltd. on the Far East Rand, and the Virginia Orange Free State Gold Mining Company at Virginia, Orange Free State.—Ed.

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STOODY COMPANY 1347 Rose Villa Avenue, Whittier, California

NEW MILL AT URUWIRA

(*Continued from page 52*)

Each of these pumps discharges into 6-inch pipe lines 12¼ miles long, discharging into a 500,000-gallon submerged concrete storage tank on the brow of the highest elevation. This tank had to be buried to prevent elephants tearing it down during droughts.

From this reservoir the water flows by gravity through a 10-inch line, 10-⅛ miles long, until divided into two 6-inch lines, for 4-⅛ miles more, to a 500,000-gallon tank similar to that mentioned above on a hill above the plant.

This pipe line has been designed utilizing war surplus pipe available in Africa and the location of the various lines has been dependent on the bursting pressures of the pipes available. All the pipe must be buried to prevent the elephants prevalent in the locality, particularly during dry spells, from tearing it up.

Electric Power Generation

Electric power for the use of the plant and town is generated by a Crossely producer gas engine plant at 330-volt, 3-phase, 50-cycle at 0.8 power factor. The capacity of this plant is being enlarged to provide some 1,800 horsepower additional connected horsepower required by the new plant. This power is distributed to two transformer stations consisting of two 750-kva transformers located adjacent to the mill, while the second of 500-kva capacity is near the crushing plant. All motors used in the new plant are International General Electric 50-cycle, 440-volt, with standard 40° C. rise.

Camp Facilities

In addition to the above, Southwestern Engineering Company has designed attractive three-bedroom houses which are to provide additional new and modern staff quarters at the property. These dwellings can be used for either family or bachelor quarters and take into consideration the problems of tropical living with the extremes of wet and dry weather. The building will be of brick with corrugated aluminum roofs.

Other buildings to be built are a warehouse, completely equipped machine shop, hoist house, change house, and new laboratory. Two Buffalo Forge Company 54-inch type "B" vaneaxial fans are provided to adequately ventilate the mine. They will be located on the surface and connected to an existing air shaft. A complete 52-inch sawmill manufactured by the Belsaw Machinery Company, is being erected to provide construction and mine timber for the plant. This mill will cut 1-inch boards from 36-inch diameter logs, 24 feet long, and will provide lumber for construction.

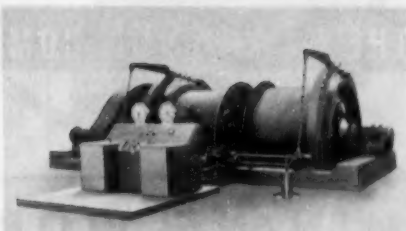
The present camp provides a native hospital and school, and contains about 5,000 natives in the company compound. The administration and care of this group are very important and a costly part of the operation. The skilled workmen are European, a majority probably Italian, and number some 200 people, including their families. Some 500 natives are expected to be employed underground when the operation attains full mill capacity.

Tanganyika Show Plant

When this plant is completed and in full operation it will be one of the show places of the Tanganyika Territory, thus fulfilling the dream of its discoverer, J. de la Vallee Poussin, and the vision of the Tanganyika government and the engineers who helped in the development of the property.

C. H. Richards is general manager, J. de la Vallee Poussin managing director, and R. Brasseur chairman of Uruwira Minerals, Ltd., Lloyd E. Daume is managing director of Southern Minerals, Ltd.

Vulcan-Denver



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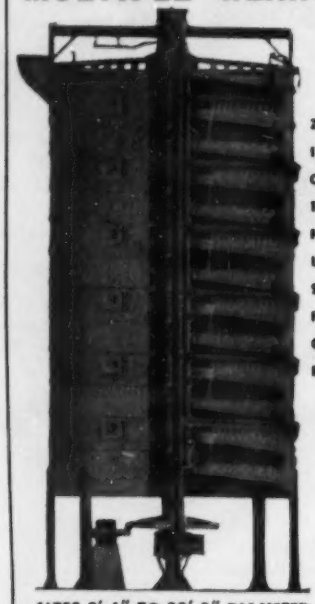

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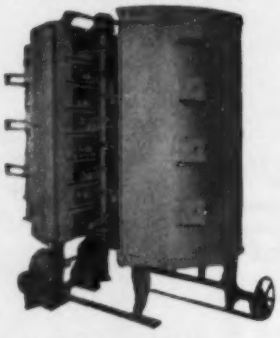

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U.S.A. Metal & Mineral Prices

METALS

December 22, 1953

COPPER:	**Electrolytic.** Delivered F.o.b. cars, Valley basis	29.50-30.00¢
	Lake. Delivered, destinations, U.S.A.	30.125¢
	Foreign Copper. Valley basis	29.50-30.00¢
LEAD:	**Common Grade.** New York	13.50¢
	Tri-State Concentrates, jig, flotation 80% lead, per ton	$166.50
ZINC:	**Prime Western;** F.o.b., E. St. Louis	10.00¢
	Prime Western; Delivered, New York	10.50¢
	Tri-State Concentrate, 60% zinc, per ton	$56.00
ALUMINUM:	**Primary 30 Pound Ingots (90% plus).** F.o.b. shipping points	21.50¢
ANTIMONY:	**Lone Star Brand.** F.o.b. Laredo, in bulk	29.00¢
BISMUTH:	(in ton lots) price per pound	$2.25
CADMIUM:	**Sticks and bars.** 1 to 5 ton lots (Price per pound)	$2.00
COBALT:	**97-99%,** keg of 550 pounds (Price per pound)	$2.60
COLUMBIUM:	**Powder** Nom., per pound	$75.00
MAGNESIUM:	**Ingots (99.8%).** F.o.b. Freeport, Texas	27.00¢
MERCURY:	**Flasks.** Small lots, New York	$188.00-$189.00
NICKEL:	**"F" Ingots (5 pounds).** F.o.b. refinery,, Port Colbourne, Ontario	60.00¢
TIN:	**Grade A Brands.** New York (Price per pound) Prompt delivery	82.00¢
TITANIUM:	**99.3%** + (Price per pound)	$5.00
GOLD:	United States Treasury price	$35.00 per ounce
SILVER:	**Newly mined domestic.** United States Treasury price	90½¢ per ounce
	Foreign Handy & Harman	85.25¢ per ounce
PLATINUM:		$91.00-93.00
ZIRCONIUM:	**Powder,** 100 pound lots, per pound	$7.00

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CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian). 48% Cr_2O_3. 3 to 1 Ratio	$44.00-$46.00
	African (Transvaal). 48% Cr_2O_3. No Ratio	$34.00-$35.00
	Turkish. 48% Cr_2O_3. 3 to 1 chrome-iron ratio	$54.00-$56.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.	
COLUMBIUM-TANTALUM ORE:	At United States small lot beryl purchase depots. $3.40 per pound contained combined pentoxides in 50% ore.	
IRON ORE:	Lake Superior. Per gross ton Lower Lake Ports	
	Mesabi, Non Bessemer, 51.5% Fe. Second quarter	$9.90
	Mesabi, Bessemer, 51.5% Fe. Second quarter	$10.05
	Old Range Non Bessemer. Second quarter	$10.15
	Old Range Bessemer. Second quarter	$10.30
	Swedish, Atlantic Ports, 60 to 68% Fe, Contracts, Per Unit	20.00¢
MANGANESE ORE:	**Metallurgical grade.** 46 to 48% Mn. Long ton unit	$1.05-$1.07
	Chemical grade. 80% MnO_2. Per ton	$70.00
	Domestic U. S. Government are purchasing depots: Deming, New Mexico; base price $2.30 per long dry ton unit of recoverable manganese less handling and treating costs. Wenden, Arizona; base price of $8.54 per long dry ton of 15% manganese ore. Butte, Montana; (black and pink ores) base price of $4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana base price of $6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.	
MOLYBDENUM CONCENTRATE:	90% MoS_2 F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers	$1.00
TUNGSTEN CONCENTRATE:	**Domestic.** 60% WO_3 Per short ton unit	$63.00-$65.00
	Foreign. 65% WO_3 Per short ton unit (Scheelite)	$32.00
URANIUM ORE:	**Carnotite-Roscoelite.** F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado, Salt Lake City, Marysvale, Thompsons, and Monticello, Utah. Shiprock, New Mexico, Edgemont, S. Dakota. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ores purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime.	
VANADIUM ORE:	**Carnotite-Roscoelite.** V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello and Shiprock. Per Pound V_2O_5,	$0.31

NON-METALLIC MINERALS

BENTONITE:	**Minus-200-mesh.** F.o.b. Wyoming points. Per ton in carload lots	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	**Metallurgical grade.** 70% effective CaF_2 content per short ton F.o.b. Illinois- Kentucky mines	$42.50
	Mexican. 70% f.o.b. border	$30.00
	Acid Grade. 97% CaF_2 F.o.b. Kentucky, Illinois, Colorado	$60.00
PERLITE:	**Crude:** F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants	$7.00 to $9.00
SULPHUR:	Long ton, F.o.b. Hoskins Mound, Texas	$25.50
	Export	$30.50

LONDON METAL AND MINERAL PRICES

December 18, 1953

		Per Long Ton	USA Equivalent cents per pound[1]
COPPER:	**Electrolytic, spot**	£228 10s 0d	28.56¢
LEAD:	**Refined, 99.97%**	£90 5s 0d	11.28¢
ZINC:	**Virgin, 98%**	£74 10s 0d	9.31¢
ALUMINUM:	**Ingot, 99.5%**	£150 0s 0d	18.75¢
ANTIMONY:	**Regulus, 99.6%**	£210 0s 0d	26.25¢
TIN:	**Standard, 99.75%**	£655 0s 0d	81.87¢
TUNGSTEN:	**Long ton unit, 160-170s, equivalent to**		$22.40-$23.80

1. With Sterling pound at $2.80.

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N.Y.

AT Bessemer Limestone & Cement Co., Bessemer, Pa., one McCarthy unit (above) averages 90 ft. per hour, drilling through hard blue shale and sand rock 34 ft. deep. Blast holes are drilled on 18-ft. centers. Two men handle the whole job, including setup and moving. McCarthy drills operate with gasoline, diesel or electric power units . . . on all types of mounts. McCarthy "money-savers" can work for you. See your nearby distributor or write Salem Tool direct for further information.

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PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill, or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.

Industrial Diamonds Are A Miner's Best Friend

This new 16-page booklet, "The Diamond That Pays for Itself," may be one of 1954's best sellers. It tells the story of the industrial diamond—its sources, properties, and uses.

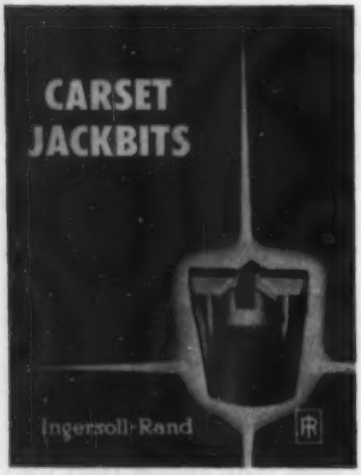
You'll find out for example that the industrial diamond is a sky-rocketing mineral: World consumption rose from 500,000 carats in 1919 to 10,000,000 in 1952. Also that all the world's electric-light wire is formed by drawing through tiny holes drilled in diamonds. And that one of diamonds' biggest uses is in the cutting and grinding of a competitor—tungsten carbide.

The booklet was published by the Industrial Diamond Association of America, Inc., which represents 72 American industrial-diamond firms. Circle No. 75.

IT'S FREE (No.) CIRCLE IT

Carset Jackbits For Every Drill and Hole Size

A new bulletin, Form 414C, showing the complete range of Carset Jackbits for use with most of the popular threaded connections in use today was recently issued by Ingersoll-Rand Company. The



bulletin gives the user a selection guide for choosing the right Carset Bit for each connection and application. You will want this handy guide for everyday reference. Check No. 72.

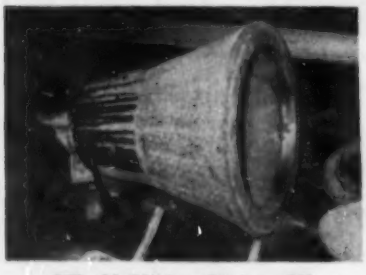
NEW MODEL TRUCK FOR ROUGH TERRAIN

The New International model R-140-4x4 is one of two four-wheel-drive models in four wheelbases introduced by the motor truck division of International Harvester Company for use in rough terrain. A Failing drilling unit designed for mineral exploration and seismic shot-hole work is shown mounted on the new model truck.

Model R-140-4x4 has gross vehicle weight rating of 11,000 pounds, in 130 or 142-inch wheelbase. Model R-160-4x4 has gvw rating of 16,000 pounds in 154 and 172-inch wheelbase. Front and rear axles of the new models are single reduction hypoid bevel gear type. Transfer case in both models has 1 to 1 and 1 to 1.87 gear ratios providing, in combination with the four-speed transmissions, 8 forward and 2 reverse speeds. Both models are available with front-mounted winch.

Economical Hard-Facing With Coated Tube Stoodite

After nearly two years of extensive field tests, the Stoody Co. has introduced a new electrode with chromium and molybdenum as the principal alloys. This new electrode is particularly suited for hard-facing heavy-duty mining and construction equipment. Performance records of Coated Tube Stoodite compare with most electrodes selling at a much higher figure, and the new material has far outworn other materials in the same price bracket.



The deposition rate is faster than can be attained with cast electrodes, and the welded deposit is smooth, sound, and free of pinholes or checks. This material provides especially good resistance to all types of abrasion, exhibits high compressive strength, and has excellent impact resistance. Coated Tube Stoodite is readily weldable to all carbon and alloy steels including manganese. Deposits are semi-austenitic, and are not affected by ordinary heat-treat methods. Under normal welding procedure, either a-c or d-c, deposits show a Rockwell C hardness of 56-60; properties are retained at temperatures up to 800° F. Descriptive literature is available by circling No. 74.

NEW USES FOR SILICON CARBIDE: In addition to its abrasive applications, silicon carbide also has some unusual physical and chemical properties. It is finding increasing use in the manufacture of a number of other completely different types of products. A new 52-page brochure by The Carborundum Company, tells how silicon carbide is being used in the manufacture of resistors, deoxidizers, catalyst carriers, super-refractories, porous media, and electric heating elements. The brochure discloses the properties of silicon carbide as related to the above uses and outlines manufacturing techniques. Circle No. 55.

PUSH UP PRODUCTION and push down your earthmoving costs. Speed and economy in getting scrapers loaded are a feature of Caterpillar's new D8 Pusher-Tractor. You will find the D8 Pusher very useful for incidental 'dozer jobs, too. Form 30903 gives details and specifications as well as pictures and illustrations. Circle No. 52.

IMPARTIAL COMPARISON: In the right application, plastic pipe can outperform any other pipe many times. Republic Supply Co. has issued a special report showing the comparative features, properties, and types of plastic pipe. The report is impartial because Republic handles both plastic and metal pipe. You may find that plastic is the answer to many of your pipe problems. Circle No. 56.

DRILL STEELS: A 20 page, illustrated booklet issued by Bethlehem Steel Co. discusses four groups of drill steels: hollow steel for blast holes, solid drill steel, broaching and channeller steel, and stone-dressing steel. A typical chemical analysis of each type of steel as well as detailed recommendations for the forging and heat-treatment of these steels is given. For your copy of "Bethlehem Mining and Quarrying Steels" (Booklet 345), circle No. 57.

UNDERGROUND CORE DRILLS: Two sizes of air-operated diamond core drills are described in Sprague and Henwood's bulletin No. 340. Detailed specifications of the No. 325 and No. 550 drills are given. Rod pulling apparatus, consisting of an air actuated piston, is also described for each machine. Circle No. 58.

DIESEL EXHAUST CONDITIONER: MRX-Type conditioners are treating exhaust gases of underground Diesel powered equipment, ranging in engine size from 15 to 315 hp., and are permitted by the Chief Mining Inspector, or the Commissioner of Mines in 17 out of the 48 states. The Ruth Co. of Denver, Colorado, completely describes their MRX-Type conditioner in a new booklet. Interested readers are invited to circle No. 59 and receive a copy.

OUTWEARS STEEL: Iron-Rubber sheets, produced by the Magic Chemical Co., are guaranteed to outlast the material they protect many times. They are ideally applicable for chute lining and will increase your production by eliminating shutdowns. Circle No. 14 and you will receive information on the many uses and advantages of Iron-Rubber.

INTERESTED IN DIAMONDS? A new 16-page booklet, "The Diamond That Pays for Itself," tells the story of industrial diamonds—where they are found, how they are used, and other information that should be most worthwhile to the men who find, mine, and use industrial diamonds. Circle No. 6.

COMPLETE LINE LISTED: A new twenty-page catalog by the International Harvester Export Co. describes the complete line of its industrial power equipment. This two-color booklet outlines the performance features and specifications, and illustrates each of seven crawler tractor models, eighteen power units, and one wheel-tractor. Circle No. 7 for your copy of form E-1-D.

SAVE WITH OXYGEN: A new bulletin entitled "Oxygen-Index of Combustion Processes" graphically illustrates and explains how too much or too little air can have costly effects in combustion processes. It also points out the greater efficiency and savings that can be realized by the use of oxygen as the criterion to proper combustion. For a copy of Arnold O. Beckman, Inc.'s bulletin AD-607, circle No. 8.

THE STORY OF CLIMAX: A new brochure called "Moly From The Mountain" tells how Climax Molybdenum Co. employees mine, mill, live, and play in the high altitude of the Colorado Rockies. Even the colored inks used in the brochure are molybdenum pigmented printer's inks. You will want a copy of this brochure, and you may have one by writing to Gordon Weller, Public Relations Director, Climax Molybdenum Co., Climax, Colorado, or by circling PEP No. 9.

NEW ONE-MAN DRILLING MACHINE: The Thor No. 380, automatic drilling machine, with integral air-leg feed and automatic air-water back-head weighs 80 pounds. The integral air feed eliminates improvised clamping, extra air hose; consolidates drilling and feed controls on back-head of machine. It is easier to set up, easier to adjust, and easier to run. For further information circle No. 41.

NEW FIRST AID KITS: MSA has just issued a bulletin describing its new and complete line of Type D All-Weather First Aid Kits. There is a first aid kit to meet every need. Bulletin No. 0401-2 will be sent if you circle No. 43.

CORROSION AND ABRASION CONTROL: Goodall Rubber Company has published a new booklet describing modern practices and products for the positive protection of all types of metal equipment from the effects of corrosion and abrasion. The booklet also has detailed information on accelerators, thinners, primers, curing, coverage, etc. Circle No. 44 for your copy.

CYCLONIC CENTRIFUGE: Separation of solid particles of different size and specific gravity suspended in a liquid, is a result of centrifugal and centripetal forces in the Oliver Centriclone. It is especially adapted to classifying and separating fine from coarse solids in liquid suspension, with size separation down to 10 microns. This type of equipment offers low capital investment and maintenance with high capacity and greatly reduced floor space. Bulletin No. 800 is available to interested readers. Circle No. 45.

COOL, ROUND, AND RIGID is how the Allis-Chalmers air-cooled kiln keeps the discharge end of kilns. Available as an integral part of new kilns or as a replacement item, the kiln end will pay for itself many times over in fuel, refractory brick, and downtime savings. Your copy of Bulletin 07B8040 will be sent if you check No. 49.

PORTABLE MERCURY VAPOR DETECTOR: The presence of cinnabar in ores may be quickly detected by the Kruger Mercury Vapor Meter. When used for determining areas contaminated with mercury vapor, the actual concentration can be read directly on the calibrated meter. Circle No. 1 for further information on Harold Kruger Instruments' new Mercury Vapor Meter.

Circle numbers and mail this card for free product literature

to get further information on any item described in the Production Equipment Preview, note the key number of that item, circle the corresponding number on the PEP card at the right, and mail. If mailed from a point outside the United States, proper postage must be used.

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SAFE DEPENDABLE HOISTING: Vulcan Iron Works has specialized in building hoists for 62 years. Vulcan-Denver hoists can be depended on for long life with a minimum of maintenance costs. Hoist sizes up to 1500 H. P. are available. Send for a copy of the Vulcan Iron Works Catalog by circling No. 35.

QUICK CONVEYOR FASTENERS: Bulletin T-600 describes Flexible Steel Lacing Co.'s *drive-on* fasteners for making quick, tight joints and repairs on conveyor belts. New and improved design brings edges of belt together—no gaping openings. Circle No. 36.

MORE EXTRAS are included in the low initial cost of Nordberg Diesel engines. Details on Nordberg Diesel power units from 10 to 45 hp. can be found in the catalog covering 4F5 Diesels. Circle No. 37.

NEW INFORMATION ON SPIRALS: A new bulletin describes the world-wide application of Humphreys spiral concentrators. Bulletin No. 17, a reprint from MINING WORLD, is available to all interested readers. Circle No. 38.

PUMP OPERATION WITHOUT SEALING WATER: The Centriseal pump, of the Allen-Sherman-Hoff Pump Co., is designed to operate entirely without sealing water. If your pulp must be delivered undiluted or if sealing water is not available, the Centriseal is your pump. Brochure No. 853 gives the details. Check No. 39.

ABC'S OF A-C MOTOR CONTROL: A 36-page special issue of the "E-M Synchronizer" presents in an easily understood manner, the basic facts that are helpful in the proper selection and application of controls for large industrial motors. This booklet, available from the Electric Machinery Mfg. Co., contains more than sixty illustrations and charts. It also includes discussions of the latest developments in motor and personnel protective features. Your copy of "E-M Synchronizer No. 39" is available by circling No. 30.

CROSS SECTION OF D8 CAT: An illustrated pamphlet (Form 30875) shows all the advantages offered by the Caterpillar D8 Tractor. Features, including the new triple plate, oil-type flywheel clutch, are fully explained and pictured. If your job requires a tractor that gives longer life and less down time, you'll want to circle No. 53 for complete details.

HANDY REFERENCE GUIDE: The Jeffrey Manufacturing Co. will send its Catalog No. 860 on material handling and processing equipment to interested readers. This comprehensive, 43-page catalog explains the broad facilities of Jeffrey to cope with problems of any type and size under almost any condition. Circle No. 2 to get your copy.

PETROFLOTES (Petroleum Sulfonates) are refined by L. Sonneborn Sons, Inc., New York 10, N.Y. They are modifiers for fatty acids or tall oils and collectors for specific non-metallic and metallic oxide-carbonate ores. Write on company stationery for bulletin and free sample.

NEW BEARINGS GIVE LONGER LIFE: The "C" bearing developed by SKF Industries, Inc. has increased capacity ratings from 25 to 50 percent and permits the handling of greater loads. The principal feature of the improved bearing is an inner race design which allows longer roller contact and eliminates undercuts and integral flanges. The service life will be 2 to 3-½ times longer than formerly possible. Circle No. 3 for details.

PACKED WITH FACTS: A newly released publication entitled "Caterpillar Diesel D6 Tractor" describes what goes into making up each component. In addition to a specification sheet and attachment list, the booklet suggests other equipment that may be used with the D6 Tractor. You will get a copy of Form 30379 if you circle No. 4.

LONG RANGE CABLEWAY: A 4-page brochure on long-range materials handling machines has just been released by Sauerman Bros., Inc. Line drawings are utilized to provide a simple explanation of how the drag scraper, slackline cableway, and tautline cableway operate. Circle No. 5 for a copy of this informative brochure.

SCREEN HEATERS REDUCE COSTS: Reduce your processing costs 30 to 50 percent with HANCO Electric Screen Heaters. These heaters convert 220, 440, or 550 volt, 50 or 60 cycle current into low-cost, low-voltage current delivered to the screen cloth. Resistance to passage of this current generates heat in the screen wires, making it impossible for moist material to clinge to them. Clogging or "blinding" is eliminated and, with the mesh always open, screening is speeded up. The Quick-Change Attachment of the HANCO Heaters overcomes past objections to electrical screen heating and enables cloth changes to be made as fast on heated screens as on the unheated ones. Bulletin 521 of F. R. Hannon & Sons completely describes these screen heaters. You will want to know more about them, so circle No. 18 now!

DIAMOND BITS FOR MINING: American Coldset Corp.'s line of mining bits are distinguished by their "Shark-Tooth" pattern. Each tooth is a unit of diamonds and waterway. Diamonds are set flush in the matrix, and oriented for a cutting angle of 8 to 25 degrees in compression. For the company's new six-page folder, circle No. 15.

LECTROMELT YOUR ORE: The Pittsburgh Lectromelt Furnace Corp. has just issued a new catalog, No. 105, describing the many advantages of its Lectromelt Furnaces for smelting ore and concentrates of copper, nickel, iron, magnesium, cobalt, and many other metals and nonmetallics as well. Circle No. 19 to get your free copy of this informative catalog.

BALANCED VIBRATING CONVEYORS: A new principle of counter-balancing the forward and reverse movements of reciprocating troughs is featured in Syntron's "Balanced, Dual Trough" vibrating conveyors. The two troughs, mounted one above the other, are connected by leaf springs and the whole assembly, supported on guide links, follows the movement of the eccentric drive. The new unit can be used for conveying, conveying and screening, or distributing hot or cold, dry or damp bulk materials, in size from granules to big chunks. For further details of Syntron Co.'s vibrating conveyors, circle No. 16.

REAGENT RESEARCH by the American Cyanamid Co. has developed new chemicals for thickening and filtration. These Aerofloc Reagents are now in commercial use in plants concentrating precious metal, base-metal, and nonmetallic ores. They speed-up and effect more complete settling, conserve values previously lost to thickener overflow, increase filter capacity, and reduce moisture in filter cake. For further information about Aerofloc Reagents, circle No. 17.

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New Eimco 105 Features Unidrive Transmission

The Eimco Corporation announces its entry into a new field of heavy machinery with its Eimco 105 which is basically a new heavy prime mover available with its own excavating attachment and other tools. It is heavier than their previous large model, and has numerous design and operating improvements.

The most important of these is Eimco's new Unidrive Transmission, containing, in one compact unit, all of the gearing and clutches for speed changing and full independent reversal of each track. The design combines all of the best features of torque converter, constant mesh gearing, and hydraulically actuated friction

clutches with sealed oil bath, and pressure lubrication of all wearing parts. One important feature made possible by the new transmission is the independent control of each track. The ability to run one track forward and the other reverse provides maneuverability not possible in any other tractor.

Controls are simple. All movements of the tractor are with the two small conveniently located handles immediately in front of the operator. These two handles are close together and are held in the operator's hand in such a way that an easy push on the two levers moves the machine forward and a pull reverses the machine. Twisting the levers provides a "spin" turn. Releasing either lever so it automatically returns to neutral will permit a "feathered turn." Bulletin L1032, giving complete details, is available to all interested readers. Circle No. 77.

New Throttle Control For Improved Performance

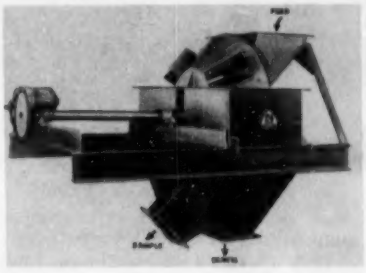
Introduction of a new positive-action, friction-type throttle control designed to improve the performance of gasoline or Diesel-powered equipment has been announced by the Link-Belt Speeder Corporation, Cedar Rapids, Iowa. This new throttle control, which provides an infinite range of engine speeds, can be used on shovels and all other construction machinery, crushers, drilling rigs, and similar equipment.

The control, once set, holds the engine speed constant despite vibrations which might be encountered. The control is easily mounted in the field, and no adjustment is necessary to compensate for engine size or type.

Increase or decrease of engine speed with this new throttle control is fast and positive, and requires little effort. The control will stay put in any position, with any governor pull up to 75 pounds. The elimination of ratchets and pawls, plus a negligible number of moving parts, keeps wear to an absolute minimum. The details will be found in Folder 2476. Circle No. 78.

Dry Ore Sampler For Limited Headroom

The Denver (Snyder Type) Ore Sampler, manufactured by the Denver Equipment Company, Denver, Colorado, is ruggedly designed for the most accurate and representative sampling possible. The operation of this sampler is easily observed and due to simplified construction, the unit is easily cleaned. Maintenance is low



and cutter openings are replaceable.

The Denver Equipment Company offers a complete range of sizes in both simplex and tandem samplers. The tandem unit incorporates a mixing barrel which thoroughly mixes the primary sample before the final cut is made. Circle No. 69 for further information.

New 8-oz Plastic Pump Delivers up to 350 gph

Jabsco Pump Company has recently announced a new series of low cost plastic pumps suitable for reagent pumping. The company states that the tough, long-lived Jabsco neoprene compound impeller, the only moving pumping part, is inexpensive and is resistant to more acids than any other type of rubber.

Stainless steel, Hastelloy B, or Pyrex glass shafts are available in the Model 3010 pumps. Get your copy of Bulletin JPS-3010 by circling No. 79.

Notes From The Manufacturers

R. E. McDonough is representing Electric Machinery Manufacturing Company, headquarters in Minneapolis, Minnesota, in Butte, Montana. Mr. McDonough, who has had 32 years experience in the electrical industry, represents several electrical equipment manufacturers in his area.

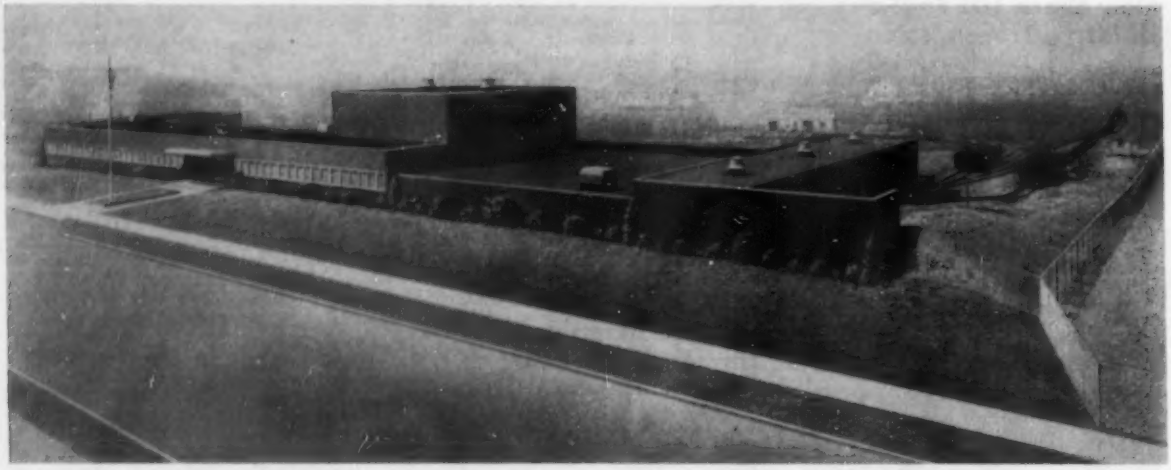
Wilmot Sandham has been appointed Southwestern Regional Manager of Cummins Engine Company, Inc., headquarters at Columbus, Indiana. Mr. Sandham's office is in Los Angeles. He was formerly an automotive and service engineer for General Petroleum Corporation in Los Angeles. Mr. Sandham will represent Cummins in California, Nevada Arizona and New Mexico. *A. S. Leonard*, who formerly held Mr. Sandham's position, is now president of the new Southwest Cummins Dealership. Cummins Rio Grande Sales and Service, Inc., which will handle Albuquerque, New Mexico, and El Paso, Texas, operations. *J. D. Denny* is vice president of the dealership which has headquarters in Albuquerque and a branch in El Paso. Territory assigned to Cummins Rio Grande includes all of New Mexico and El Paso, Hudspeth and Culberson counties in Texas.

G. N. Dow has been appointed Chicago district sales manager of the Leschen Wire Rope Division of the H. K. Porter Company, Inc., of St. Louis, Missouri. Until his present promotion, Mr. Dow had been district representative for Leschen in Detroit, Michigan. His new district includes Northern Illinois, Iowa, Wisconsin, Northern Indiana, Michigan, and Minnesota.

William M. Staples has been named to the post of manager of construction by Chemical Construction Corporation, an American Cyanamid Company unit which designs and builds chemical plants. He replaces *Harold E. Broughton*, who resigned to become a consultant to the firm.

Thaddeus S. (Ted) Ullmann, assistant export manager of the EIMCO Corporation of Salt Lake City, Utah, has been promoted to export manager. He will continue to make his headquarters in the EIMCO Building at 51-52 South Street, New York City.

HAROLD T. REISHUS, has been elected vice president, Industrial Power Division of the International Harvester Company which has its headquarters in Chicago, Illinois. I. P. PAYNE has been appointed manager of sales for the Industrial Power Division. Mr. Reishus has been general manager of the Division since its formation in 1944. The Industrial Power Division manufactures tractors and allied equipment for the mining industry. In the November issue, page 67, Mr. Reishus was mistakenly pictured as A. C. Richardson, newly appointed Technical Director of the Battelle Institute. MINING WORLD regrets this error and any embarrassment it may have caused both Mr. Reishus and Mr. Richardson.



Complete mine car testing facilities are an important part of the new Cleveland Technical Center of National Malleable and Steel Castings Company. The physical testing laboratory is one of the world's finest.

Tomorrow's Mine Cars Will Be Developed At National Malleable's New Testing Center

What's new in mine cars is now being tested at the recently completed Technical Center of National Malleable and Steel Casting Company in Cleveland, Ohio. Much that is old is also undergoing tests to determine what is good (or best) in mine car design and construction. Even more importantly, perhaps, is the promise that much that is really new and better will be developed and made available to industry because the center has been established.

For 85 years, National Malleable and Steel Casting Company has been originating and producing cast products for transportation and industry. Many basic patents on railroad truck, coupler and draft gear design are held by National. With the opening of the new Technical Center, it hopes to establish a new high standard for engineering and research in the industry. Much of the equipment is unique, but the Center's real distinction lies in the range and completeness of its facilities. From this standpoint it is said to be without equal anywhere in the world.

The Technical Center is composed of four coordinated sections:

1) An extensive physical testing laboratory with a wide range of equipment including electronic measuring and recording devices.

2) National's engineering department which develops products, engineers production methods, and provides customers with technical services.

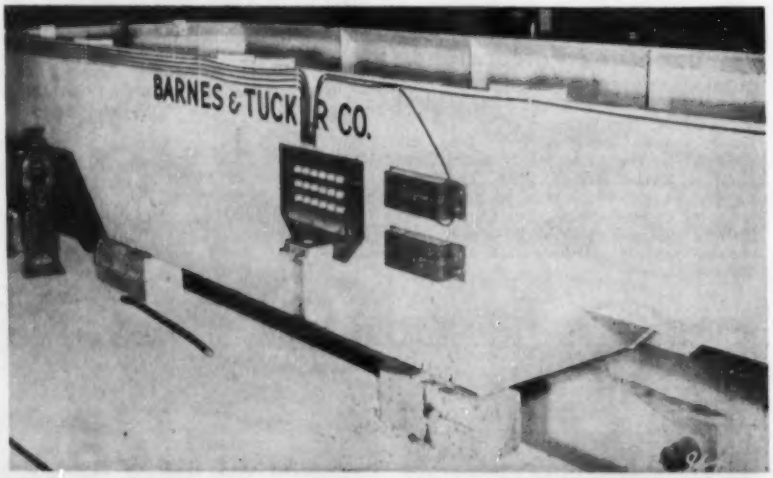
3) A proving ground with test tracks, car pits and National's privately owned and especially equipped mine and railroad cars.

4) Administrative quarters and meeting rooms.

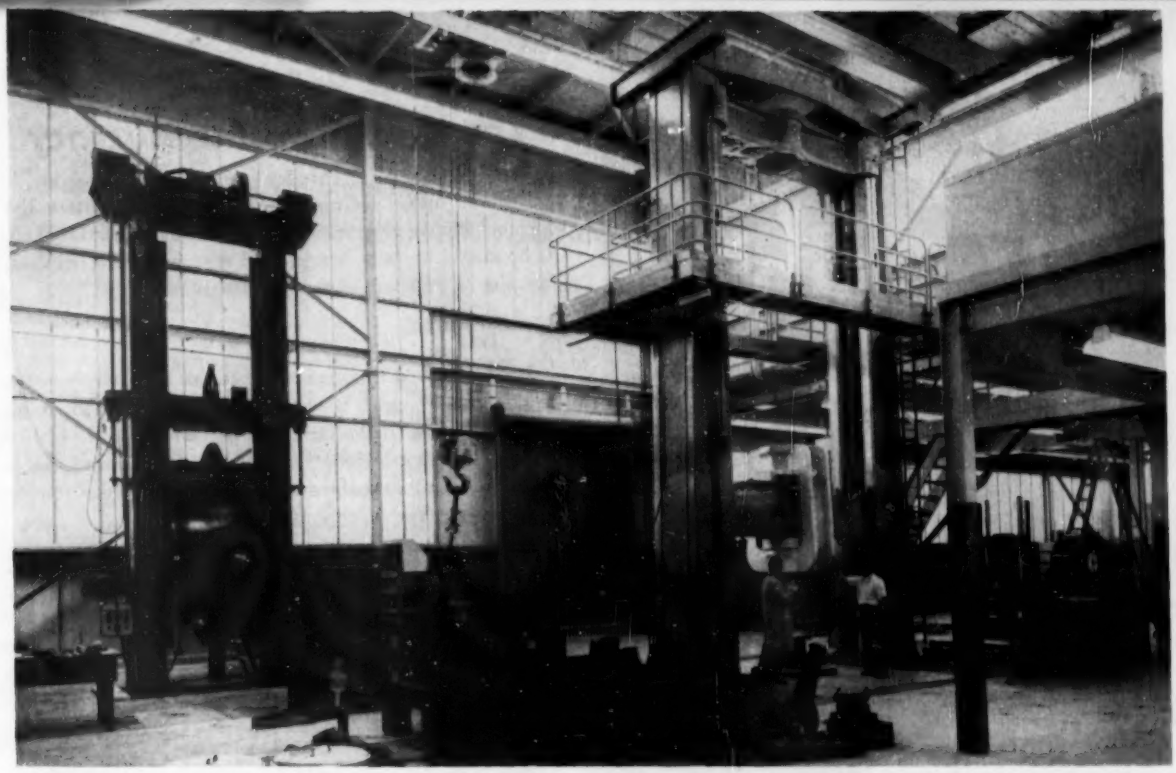
While the Center will be devoted first of all to work with the company's own products, it is expected that the facilities will serve other companies and individuals who have long felt the need for the range of equipment now brought together in this one place.

Ideal Surroundings for Research

The physical aspects of the Center provide an opportunity for thought, study and research. Located on about six acres that will be beautifully landscaped, the two story, and basement, reinforced concrete building is the latest word in mod-



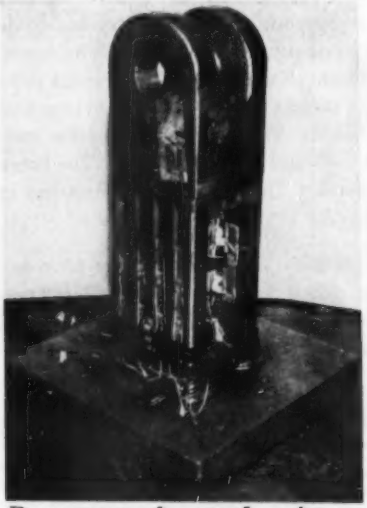
Testing a mine car at the new Technical Center. Receptacle panel and SR-4 dummy gauge blocks installed on side of car. Panel provides access to strain gauges, accelerometers, etc. installed on car.



The largest mine cars can easily be tested in this section of the Technical Center. The machine on right is 1,000,000 pound static test unit for 16 by 10 foot specimens. Test loads can be either in tension or compression.

ern appearance, design and construction. It is completely air conditioned and has fluorescent lighting throughout. Offices and halls are spacious, pleasantly decorated in grey and green, and have white acoustic tile ceilings. The equipment for test work is the finest available.

The proving ground includes a test track, both standard and narrow gauge, which is used for conducting impact tests. Impacting cars are pulled up an incline with a power winch and allowed to roll into a standing car that is equipped with the devices to be tested. The release position of the impacting car on the incline determines the speed of impact.



Dynamometer bumper for mine car showing SR-4 strain gauges.

The standing car can be arranged to determine the exact amount of stress on any portion. This need not be a trial and error method either. Engineers will paint the area to be tested with a fast-drying black, shellac-like material. The strain of one impact checks the coating and it is then painted with a white material which shows the areas of greatest stress. Strain gauges can be applied directly to these points.

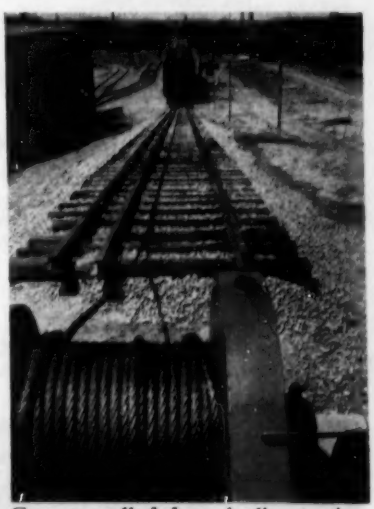
Inside the building are located testing machines of all kinds. One of the two static testing machines has a capacity of 1,000,000 pounds and is large enough to accommodate a full sized railroad freight car standing on end. There are drop test machines, dynamic fatigue test machines, and coupler angling and anti-creep test machines, etc.

The latest high speed photographic and electronic measuring and recording devices round out the physical equipment. To these are added National's large and highly trained research staff.

To Study Mine Cars

In its work with mine cars, the company expects to learn much. In the past, most mine car development has been haphazard with improvements resulting from the long trial and error method of testing. National was one of the pioneers in automatic couplers for mine cars and also a leader in the swing to rubber draft gears and the use of standard railroad type trucks in small sizes for mine car use. Current experimental work on automatic air brakes seems to indicate they may have promise, especially from the safety standpoint.

The development of better and safer mine haulage may be speeded as a result of this Center concentrating its skill and equipment on the solution of transportation problems.



Cars are rolled down incline to simulate service impacts.

fact:

nothing in the world is as hard as a

diamond

FACT: *in grinding carbides* — nothing cuts as fast, as cool and as economically as a diamond wheel.

FACT: *in drilling* — diamond bits give lowest cost per foot in hard geological formations.

FACT: *in dressing grinding wheels* only diamond dressers will do the job where fine finish, high production or intricate forms are involved.

FACT: *in wire drawing* — diamond dies assure accurate sizing, bright finish and high output.

FACT: *in lapping* — diamond compounds and powders save countless skilled man-hours by producing wanted sizes and finishes faster.

FACT: *in cutting* — diamond cutting and boring tools are standard for tough jobs where the best of competitive materials fail.

FACT: *in sawing* — diamond saw blades feature speed and economy on quartz, concrete, stone, sapphire, glass and diamond.

FACT: **Diamond Tooling gives you precise production, more production, uninterrupted production, *lowest cost production.***

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The Growing Bureaucracy

"To the miner let me say that he stands where the farmer stands, the work of the world waits for him. If he slacks or fails, armies and statesmen are helpless. He also is enlisted in the great service army."

Woodrow Wilson

We have used this quotation before, and we hope to repeat it again, until the paramount position of the mining industry is in the minds of our whole circle of listeners. Events in recent years have demonstrated that a shortage of minerals means hardship to all other major industries—notably agriculture.

We are all aware of the fact that all the Bureaus in Washington are banded in a continuing campaign to prevent any activity that would interfere with their arbitrary actions in controlling all the public lands, of every kind. Some United States Senators and Representatives, by their actions, have shown that this campaign has their support, beyond rhyme or reason.

This is demonstrated by a measure now on the Congressional Calendar for consideration. It utterly fails to present any equitable plan for solving the dispute in public land use. In fact, it so far fails that it reminds one of a little story current in University of Notre Dame science classes:

The professor asked one of the students to describe a lobster. His reply—"The lobster is a fish. The lobster is red. The lobster always travels backward."

"Fine," exclaimed the professor. "That is a complete answer. However it is somewhat inaccurate. Firstly, the lobster is not a fish. The lobster is not red, when alive. The lobster does not always travel backward."

If the author of the present bill, and others, who, like him, act to represent agriculture, were more familiar with how much a prosperous mining industry has to do with the welfare of agriculture, their thought and action might be much different. For example, in a recent year, one mining company bought $460,000.00 in farm products directly from the farmer. This was all immediate cash settlement—freight free, and commission free. The home market is the best market. There are similar instances in every large mining camp in the United States.

Box and crate sales are a good indication of farm activity. Normally the Woodenman Co. kept at least two travelling salesmen on full time. During the last mining recession, with miners idle, one part time salesman covered the ground.

Mining and agriculture rise and fall together.

The Wanderer

Colorado Fuel & Iron Developing Comstock Open-Pit Iron Ore Mine at Iron Mt., Utah

A new open-pit iron ore mine is being developed by the Colorado Fuel and Iron Corporation at Iron Mountain, Utah. First shipments of ore from the new mine, known as the Comstock, are scheduled for early in 1954 following a planned program dating from 1945 when diamond drilling was started.

CF&I is not a newcomer to the Iron Mountain district as an increasing percentage of iron ore for its steel plant at Minnequa, Colorado has come from other CF&I mines at Iron Mountain. Location of these mines as well as the mines of the Columbia Iron Mining Company (United States Steel Corporation subsidiary) are shown on the accompanying claim map of the Pinto Iron Mining District, Iron County, Utah.

The Comstock mine is being stripped and mined under contract by the Utah Construction Company which also has the contract for building the crushing plant and ore blending and reclaiming system. CF&I experience with ore from its other Iron Mountain mines showed the desirability of crushing and blending the ore before charging to the blast furnaces as furnace efficiency was greatly improved.

The Comstock ore body is a roof-pendant Jurassic limestone replacement deposit in contact with a Monzonite Laccolith. Diamond drill prospecting has been carried out since 1945 to delimit the ore body. While no tonnage figures have been made public the ore reserves are known to be substantial.

Comstock ore is largely hematite associated with magnetite and minor amounts of quartz, calcedony, calcite, and barite. It is fairly soft, granular in character with occasional ribs of hard dense ore. The silica content is generally small. Both sulphur and phosphorus are low. Published results of vertical diamond drill Comstock hole No. 2 drilled by the U. S. Bureau of Mines during November 1942 show 151 feet of ore assaying 48.44 percent iron, 7.6 percent SiO_2, 2.7 percent Al_2O_3, 0.12 percent phosphorus, and 0.04 percent sulphur.

CF&I has been interested in the district since about 1890 when the firm acquired some claims. The Duncan ore body was stripped and mining commenced in 1942 by CF&I.

Bringing the Comstock into production necessitated construction of 2¾ miles of broad gauge railroad, 10 miles of haulage roads, and building of several miles of power transmission lines.

Committee Investigates U. S. Titanium Shortage

Recent hearings of the Senate Interior Insular Affairs Committee's subcommittee headed by Senator George Malone of Nevada have been directed toward an investigation of the present drastic shortage of titanium. Brigadier General Kern D. Metzer, chief of the Aircraft Resources Division, told the committee that the U. S. will not be able to produce enough planes to win a war unless the present shortage of titanium is overcome. He said that at the present production outlook only enough metal will be available to produce 2,000 fighter planes in the next five years with no bombers or supporting aircraft, and that "this won't win a war."

He told the committee that the Defense Department had recommended goals for 35,000 tons of titanium, but that the Office of Defense Mobilization had since reduced this and authorized General Services Administration to contract for the purchase of 25,000 tons. The aircraft industry has estimated that it will need at least 100,000 tons of titanium yearly and may need up to 250,000 tons.

General Metzger recommended assistance by the government in the form of guarantees to purchase the entire output of future titanium plants, and financial aid to anyone who has the "know how" to invent cheaper and quicker processes for the production of this metal.

John Ford, chief of the contract negotiation unit for GSA, said that at the present time the GSA has contracted for 13,200 tons of annual production with three companies, E. I. du Pont de Nemours and Company, Titanium Metals Corporation and the Cramet Corporation which is not yet in production. Present production is 2,300 tons a year or 6.5 tons per day, with Du Pont producing 2.5 tons per day, and Titanium Metals Corporation averaging 3.3 tons per day. Titanium Metals is not expected to reach full production for another few months.

Throughout the hearings it was repeatedly emphasized that the lack of economic processes is the bottleneck in titanium production. E. A. Gee, manager of the plant's technical section, pigments department, Du Pont, told the committee that at the present he could not recommend to his company further investment for production of titanium metal. We can get all the raw material necessary for the manufacture of titanium from this country and Canada, he said; the development of a new process is more important than the availability of raw materials.

In his opinion, present processes are too high in cost and have all the disadvantages of a batch process which would rapidly become obsolete if improved methods were developed. In view of this he believes that his company should devote its efforts to developing a process which would provide titanium at a price more in line with long-range military and civilian needs.

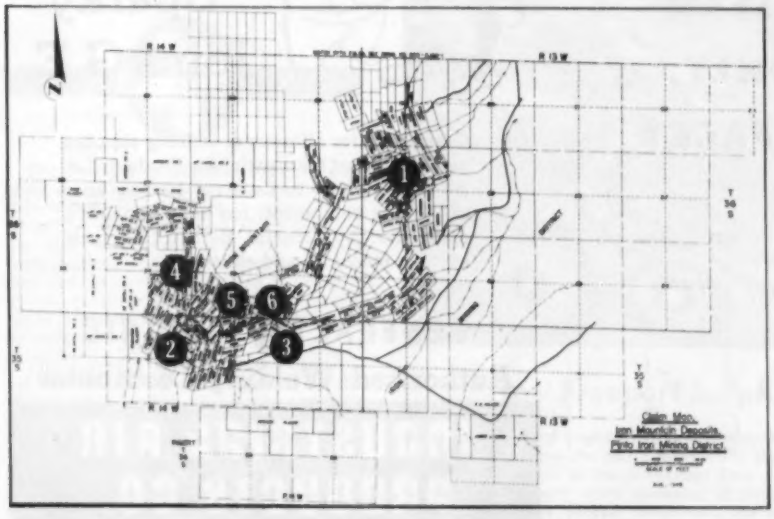
Erie Engages Anaconda To Design Big Taconite Plant

Erie Mining Company has completed plans for financing construction of facilities near Aurora, Minnesota for producing taconite pellets at the rate of 7,500,000 tons a year. Investment involved is more than $300,000,000.

The engineering department of Anaconda Copper Mining Company has been employed to do the engineering, prepare plans and specifications, and be responsible for construction of the new plant.

Immediate development calls for the largest initial ore concentrating plant ever built (approximately 60,000 tons of ore per day), and also includes construction of employee housing facilities, a 73-mile railroad from the plant to Two Islands, Minnesota, and a harbor, docks, and electric power generating station at Two Islands.

Financing has been arranged by selling $207,000,000 of first mortgage 4¼ percent bonds, due in 1983, to a group of nine insurance companies and Bethlehem Steel Company. Substantial equity capital has also been subscribed by Erie's four stockholders—Bethlehem Steel Company (45 percent), Youngstown Sheet and Tube Company (35 percent), and Interlake Iron Corporation and The Steel Company of Canada Limited (10 percent each). Erie is managed and operated for the stockholders by Pickands Mather & Co., of which Elton Hoyt, 2nd, is senior partner.



Location of important iron ore mines Iron Mountain, Utah: 1. Comstock mine, newest of the Colorado Fuel and Iron Company's Iron Mountain open-pit iron mines. 2. Duncan mine of CF&I. Shipments started in 1942. 3. Blow Out deposit of CF&I. 4. Burke mines of Columbia Iron Mining Company. 5. Pinto mine of Columbia Iron. 6. Black Hawk mine of Columbia Iron.

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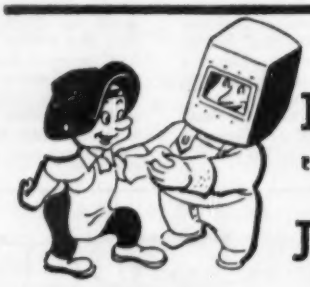

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Good news for all users of welding supplies and equipment! Industrial Air Products Co. now, in addition to its many leading lines of welding equipment, has been appointed distributor by General Electric for their welding machines and electrodes.

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New Jersey Zinc Buys Arminius Mine in Virginia

The Arminius mine, inactive for nearly 30 years, has been purchased by the New Jersey Zinc Company. The mine is located at Mineral, Virginia, about 48 miles northwest of Richmond.

New Jersey Zinc has had the property under option for purchase since 1951, and has been conducting exploration work to determine the potentialities of its mineral deposits, principally lead and zinc. Diamond drilling results have led to the decision to purchase the property, unwater the mine, and continue exploration at depth. Pumping and mining equipment necessary for these operations will be installed as soon as possible.

W. L. Albers, superintendent of the company's operation at Austinville, Virginia, will supervise the work.

Lake Superior Iron Ore Shipments At Record High

Shipments of iron ore from the Iron Ranges reached a record 95,844,472 gross tons in 1953. Shipments by Great Lakes carriers could easily have exceeded 100,000,000 tons if storage facilities at Lower Lake ports and steel mills could have held any additional ore.

The previous yearly high was 92,076,781 in 1942. The 1952 shipments amounted to only 74,484,224 tons because of the steel strike. A feature of the 1953 shipments was the early start with 312,806 tons shipped in March for the third highest shipments in that month in history. Shipments in 1953 exceeded 15,000,000 tons in one month for the first time when in August 15,236,527 tons were shipped.

After making a fast start and building Lower Lake port stockpiles to record heights, shipping was tapered off in November when only 5,200,454 tons were handled, compared with 9,294,947 tons in the same month in 1952. No shipments were made in December for the first time in nine years.

The fluorspar mill of *Minerva Oil Company* at Elizabethtown, Hardin County, Illinois was closed down temporarily in November when the pond which supplies the mill with water went dry. Water from underground operations was impounded to restore mill operations, but it was questionable how long operations could continue unless some rain was forthcoming.

The eleventh annual conservation essay contest for students, sponsored by the Minnesota Department of Conservation and the Minnesota Federation of Women's Clubs, will have as its subject "Our Mineral Wealth." The contest is open from January 11 to April 9, and more than 200 high schools are expected to compete. Reference material on "Our Mineral Wealth" may be secured by writing to the Iron Mining Industry of Minnesota, 506 Sellwood Building, Duluth, Minnesota.

The U.S. Bureau of Mines currently conducting exploration work on domestic recovery of columbium-tantalum. One major project is in Pulaski and Saline counties, Arkansas where columbium is found with titanium in the black sands found in bauxite deposits. The bureau is attempting to find a process which will recover titanium and columbium metal from these sands.

Dr. Stephenson is reported to be managing the manganese property known as the *Old Dominion* mine near Star Tannery, Virginia. About 20 carloads of metallurgical grade manganese are said to have been shipped from the property.

Universal Exploration Company has reduced its zinc mining operations at Jefferson City, Tennessee from a six-day to a three-day week.

A new group called the *Independent Fluorspar Producers Association* has been formed in Elizabethtown, Hardin County, Illinois for the purpose of protecting the domestic fluorspar industry from damages caused by importation of Mexican fluorspar. An attempt will be made to have a bill introduced in the new session of Congress to increase the $7.50-per-ton duty on metallurgical fluorspar, or to restrict importation by placing a quota on the number of tons to be imported within a year. Producers in Crittenden County, Kentucky have been urged to join the group since fluorspar is so important to the economy of both counties.

The production tempo at *International Minerals and Chemical Corporation's* Bonnie, Florida, plant has been increasing daily with some 65 carloads of multiple superphosphate and 16 carloads of 20/FOS being shipped most recently.

The construction contract for the titanium facilities being designed for *Cramet Inc.* at Chattanooga, Tennessee has been awarded to *Turner Construction Company* of New York. *Vitro Corporation of America* is handling the overall project management and engineering for the new plant. Domestic titanium sponge production is to be increased by 6,000 tons annually when the plant gets into full production in 1955. Partial production is to begin in 1954. Cramet is a subsidiary of *Crane Company* of Chicago.

The Defense Materials Procurement Agency is financing the work of a pilot plant being operated by *E. S. Nossen Laboratories, Inc.* of Patterson, New Jersey, which will process 1,100 tons of manganese-bearing rock mixed in Aroostook County, Maine. The plant will seek to determine whether a new process developed by Dr. E. S. Nossen can profitably extract manganese. Tests are scheduled for completion late in 1954. The Aroostock deposits contains from 10 to 15 percent manganese. Mineral rights to most of the deposits in that county are held by *Penobscot Development Corporation* and *Rodney Long* of Cambridge, Massachusetts.

M. A. Hanna Company's winter stripping program calls for the removal of about 21,000,000 cubic yards of material from Minnesota operations. On the Mesabi stripping will be conducted at the *Enterprise, Douglas, Weggum, South Agnew, Morton, Section 18, Carlz, Me-*

New Freeport Sulphur Mine In Operation

After two years of engineering and construction, Freeport Sulphur Company has started pumping of sulphur from the salt dome deposit beneath Garden Island Bay in the Louisiana marshlands at the mouth of the Mississippi River. The mine is expected to yield 500,000 long tons of sulphur annually when operating at peak capacity. The picture above was taken as the development work neared completion. The large building in the upper center is the power plant. Some 3,000,000 gallons of water per day will be treated and heated by the plant and pumped through pipelines to sulphur wells more than a mile away. Sulphur mined by the superheated water will be shipped in molten form in insulated barges to storage 45 miles upriver at Port Sulphur.

sabi Chief, Perry-Wyman, Harrison Patrick A, Patrick B, and *Buckeye* mines. Stripping will also be conducted at the *Alstead Feigh, Huntington, Louise,* and *Maroco* mines in the Cuyuna group, and at the *Portsmouth* and *Yawkey.* Transformer stations will be moved at the *Douglas* to permit future stripping, and the *Duncan* and Douglas tailings pond dams will be raised. A second stockpile loading track will be built at the South Agnew and a washing and screening plant, hoist house, loading pocket and loading tracks and yards at the Morton. Some modification of the heavy density and cyclone plant is planned at the Harrison and some improvement in the heavy media circuit is contemplated at the Buckeye. A new cyclone plant will be built at the Maroco.

The *Cuyuna Ore Company* of Ironton, Minnesota has ordered a new Wemco combination dewaterer and magnetic media separator to be installed on the Cuyuna Range. The dewaterer is a 54-inch unit with a 30- by 48-inch magnetic drum separator integrally mounted and will be part of the cyclone concentration plant. Cuyuna Ore is also planning to erect an HMS plant which should be in operation for the 1954 shipping season. The separatory vessel will be an 8- by 8-foot Wemco drum.

W. S. Moore Company will install a jig plant at the *Pringle* mine near Virginia, Minnesota. The plant is to handle approximately 50 long tons per hour of minus-¼-inch to plus-65-mesh iron ore in connection with the present heavy media plant. *Western-Knapp Engineering Company* has been assigned the task of designing the plant.

Marquette Range, Michigan had its third largest iron ore shipping season in 1953, according to figures compiled since the close of the season on November 21. A total of 5,135,796 tons were shipped from Marquette during the 1953 season, compared with 4,139,245 tons in 1952. (The latter was affected by a 55-day strike, however.) The two larger season records were made in 1940 with 5,486,000 tons, and 1941 with 5,659,000 tons. The largest cargo for 1953 was 20,316 tons loaded aboard the Steamer E. B. Greene of the *Cleveland-Cliffs Iron Company.*

M. A. Hanna Company's original plans for the installation of a heavy media and cyclone plant in connection with its present wash plant at the *Carlz* mine have been changed. In place of the cyclone plant a jig plant consisting of 40 cells will be built. The primary reason for the change is that ore reserves reportedly do not warrant the more expensive cyclone installation. Only two years operation for the new plant are anticipated, starting with the 1954 season.

The *Western Mining Company* is installing the first new combination dewaterer and magnetic separator in the cyclone concentration plant at its West Hill mine on the western end of the Mesabi Range, Minnesota. This new unit has two 30- by 60-inch drum-type separators to reclaim magnetite medium at the end of the classifier. This unit will be used in the circuit to recover material essentially minus-65-mesh in size, and was built by Wemco to specifications of Western Mining Company.

The steel structure for the main mill building at *White Pine Copper Company* is now up and the building is nearly ready for the start of machinery installation. Mine development is also well along with main haulageways approaching completion. The smelter stack has been completed and work on the smelter building is well under way. The entire plant should be ready for production in late 1954.

Reserve Mining Company has started construction of an addition to its pilot plant at Babbitt, Minnesota which will house a new furnace section to make pellets. In place of the shaft-type furnace used at present, a grate-type furnace will be tried. Results of these tests will determine the type of installation to be made at the main plant at Beaver Bay which is now under construction.

Haley Young Mining Company has taken over the lease on the *Grant* mine at Buhl, Minnesota. The Grant was last operated by the *Interstate Iron Company* in 1951. The present operators have a program of stripping and stockpiling under way during the winter season looking towards first shipments of March ore with the start of the 1954 season.

An important move was made recently when the state of Minnesota approved the conversion of a number of iron ore leases to taconite leases. Properties involved were held by *Pacific Isle Mining Company, Rhude & Fryberger,* and *W. S. Moore, Company.* The approval means that holders will get a reduction in mining royalty from $5,000 to either $400 or $1,600 a year. The $400 figure applies to mining leases less than five years old. The conversions were authorized so that the mining companies could devote their efforts to development of taconite.

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NATION'S PACE-SETTER CONVENTION SET FOR JANUARY 28-30, 1954 IN DENVER

The mining industry's annual pace-setting conference, again sponsored by the Colorado Mining Association, and designated as the National Western Mining Conference, will be held in Denver, Colorado on January 28, 29, and 30, 1954.

The event is scheduled two weeks earlier than usual in order that conference and mining industry leaders may formulate a united plan of action to meet the issues confronting the mining industry. An important group of Senators and Congressmen will be on hand to participate and to listen. They want first-hand reports to guide them in formulating a national legislative policy for mining. Harrison S. Cobb of Boulder, president of the Colorado Mining Association, reports that nation-wide representation has been assured by every segment of the mining fraternity.

The convention has become internationally known as the Uranium Meeting and this year will be no exception, according to Robert S. Palmer, executive secretary of the Association. All parts of the uranium industry are working together for a common objective—more uranium production. Full cooperation has been assured and papers are expected covering the latest uranium developments in Colorado, Wyoming, New Mexico, Utah, Arizona, and South Dakota.

H. S. Cobb

R. S. Palmer

Strategic metal sections will be headed by tungsten which is becoming more and more important with the new plants and mines in Montana, Utah, and Nevada.

The gold miners are looking to this meeting for real leadership, as are the silver producers who are threatened by the silver users' desire to abandon the laws written into the Silver Purchase Acts.

Merrill E. Shoup, president of the Golden Cycle Corporation, Colorado Springs, has been selected as chairman

M. E. Shoup

H. Mathews

of the conference program. Harvey Mathews, vice president of the Stearns-Roger Manufacturing Company, Denver, will be vice chairman.

The world-famous Sowbelly Dinner will be directed by Ray Sullivan, vice president and general manager of the Minerals Engineering Company, with headquarters in Grand Junction.

H. Worcester

R. Sullivan

Harold Worcester of Montrose, president of the uranium mining company which bears his name, will be chairman of the Gold and Silver Banquet on January 29th.

Simplot Ships Phosphate Rock From Utah Mountain

Phosphate rock amounting to 16,000 tons has been shipped for the first time from the J. R. Simplot Company Fertilizer Division's open-pit operations near Randolph, Utah. The mine is on a sagebrush-covered mountain nearly 8,000 feet above sea level near the Idaho-Utah-Wyoming borders.

During the mining season from September 11 to October 26, 10,000 tons of phosphate rock were shipped to the Victor Chemical Company at Silver Bow, Montana; 5,000 tons to Consolidated Mining and Smelting Company at Trail, British Columbia; and the remaining 1,000 tons to the Simplot Fertilizer Division plant at Pocatello, Idaho. Trucks carrying the rock descended four miles down the mountain side and then levelled off for a 12-mile haul to Sage, Wyoming. From there, the rock travelled by rail.

The operation was carried out under the direction of John Kobe, assistant manager of the fertilizer production division, and Bob Truchot, foreman.

Fremont County, Wyoming Buzzes With Uranium Finds

Fremont County, Wyoming is currently the scene of vigorous uranium activity with recent news of what may be a significant discovery in Sections 8, 9, 10, 15, and 17, Township 40 North, Range 94 West. A prior discovery in Section 22, Township 33 North, Range 90 West was reported in the December issue of MINING WORLD, page 97. The latest discovery of uranium mineralization was publicly revealed when W. A. Jarvis, Edward Hinchman, and David F. Haddenham, all of Riverton, Wyoming, filed location notices in Lander, Wyoming for 28 claims covering more than 560 acres.

A Wyoming State Journal reporter, in conversations with the claim filers, learned that the men got a good count over their entire area with a super-sensitive radiation detector. They believe that the mineralization is located several feet below the surface and, at the time of the reporter's interview, they expected to start drilling soon despite blizzards, heavy drifts, and cold winds which forced other county uranium activities to slow down or halt.

Meanwhile, a flurry of activity has been centered around the original discovery. Nearly 700 claims covering 14,000 acres have been staked in the area. Residents of Lander and Riverton, Wyoming have hired bull-dozers for trench testing. The U.S. Atomic Energy Commission is operating in the field and has been reported to have dug two test holes with additional crews core drilling. The Denver office is seeking bids for considerable exploratory drilling in the area. The project calls for a minimum of 10,000 feet and a maximum of 15,000 feet of dry, non-core drilling.

Field geologists and engineers from the United States Vanadium Company, Fremont Petroleum Company, National Zinc Company, Jenkins and Hand, and Kerr McGee Oil Industries, Inc., have visited the area. It is reported that J. E. Weston, superintendent, and J. A. Mastrovich, exploration chief of Climax Uranium Company of Grand Junction, Colorado, have started inspecting claims. It is further reported that the New Jersey Zinc Company and the United States Steel Company have been in the field. According to Roman Verhaalen, superintendent for Fremont Mining and Metals Company, a winterized bulldozer is working on the firm's claims. Fremont is also getting a drilling crew to drill test holes.

Uranium Miners Paid Over $2,500,000 In Bonuses

At the last compilation, over $2,535,000 had been paid to uranium miners in the form of bonuses for uranium ores produced from eligible properties since the bonus program for initial production was put into effect on March 1, 1951. Payments are being made at the rate of about $125,000 per month. Program provisions have recently been extended through February 28, 1957.

The program was established to encourage private industry to locate new deposits and to help defray part of the high initial cost of putting a mine into production. Bonuses double the base price for the first 10,000 pounds of contained uranium oxide produced and sold from any new property and amount to a bonus of between $15,000 and $35,000, depending on grade, for first production from new properties.

Since the program has been in effect (two and a half years), a total of 329 properties have been certified as eligible for payments and 1,626 individual payments have been made. To date, 43 properties have produced more than the initial 10,000 pounds and the operators have received full benefit of the initial production bonus.

COLORADO

American Smelting and Refining Company has suspended all development

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Stanley McDougall, mine superintendent, Sullivan Mining Co., Kellogg, Idaho.

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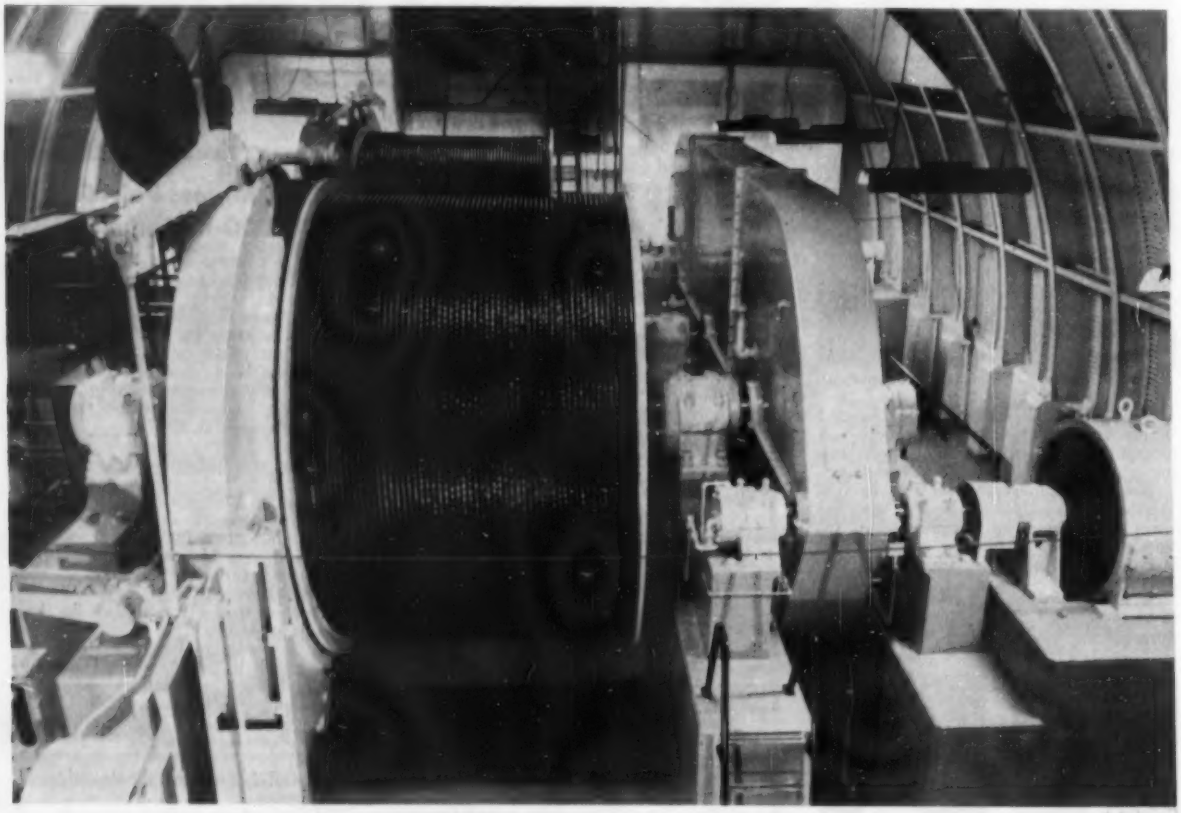

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work and closed its *Ibex-Sunday* mines at Leadville, Colorado because of the low prices for lead and zinc. ASARCO completed the new three-compartment vertical Irene No. 2 shaft to the 1,750-foot level during 1953. A. E. Haeseler is superintendent of ASARCO's Leadville district mining operations.

Cordillera Corporation reportedly has been shipping high-grade gold ore from its operations on North Star Mountain near Alma, Colorado to the ASARCO smelter in Leadville, Colorado. An underground crew has been driving a raise at the end of a 110-foot development crosscut. Mill ore is being stockpiled.

All work has been suspended at the *Callahan Lead-Zinc Company's* Akron mine operation at Whitepine, Gunnison County, Colorado. Even limited exploration and development work has ceased. J. E. Dunn, local superintendent, has stated that ore bodies have been developed to produce ore for the 100-ton-per-day mill if lead-zinc prices recover.

George Bingel and Charles Moore report the shipment of 10 tons of sorted high-grade lead ore to the ASARCO smelter at Leadville, from their *Henrietta* mine leased from the United States Metals Corporation. The ore which assayed 60 percent lead, was encountered in the Surprise vein. Extent of the vein is not known.

A large Joy compressor, which will nearly double the present air supply from the two compressors now in operation, has been installed at the *Wellington* lead-zinc mine at Breckenridge, Colorado. The new machine, which has a 916-cubic-foot displacement, was purchased from the *United States Lead Corporation* which operated the *Superior* mine at Montezuma, Colorado until its closing last year. According to W. L. Davenport, lessee of the Wellington, with the new compressor in operation the other two machines will be on a standby basis.

UTAH

The *Salt Lake Tungsten Company* of Salt Lake City, Utah has shipped its initial 50,000 pounds of tungsten oxide (synthetic scheelite) to the government. The company will reach full production this spring, according to M. N. Shaw, manager of the new refinery. Production is now at about one third capacity. Shipments of concentrates from the Glenn, Montana mill of *Minerals Engineering Company* to the refinery have commenced. The new mill has a 300-ton-per-day capacity. Minerals Engineering which, with *Sylvania Electric Products, Inc.*, owns the Salt Lake Tungsten Company, recently took over on a lease basis a tungsten mine at Brown Lake, Montana. Meanwhile, a stockpile of tungsten concentrates produced by the 100-ton-per-day mill of the *H. M. and S Milling Company* at Salt Lake City is being reduced.

The *United States Atomic Energy Commission* plans to expand its uranium mill in Monticello, San Juan County, Utah. A spokesman reports that the AEC will replace a soda ash or caustic soda reduction process used now with the conventional sulfuric acid leach methods used at other uranium mills on the Colorado Plateau. This will enable the Monticello mill to treat the new vanadium-uranium ores developed in San Juan County during 1953. The proposed expansion, if approved by the agency, will require $1,000,000. The mill, only one owned by the AEC, is operated by *Gallagher Co.* of Salt Lake City.

New Park Mining Company and associated firms are continuing to prospect drill on the Dalton Ranch, Montezuma Creek, San Juan County, Utah. This area and about 25 claims outside the ranch area will be assigned to *New Park, East Utah Mining Company*, and *Oil, Inc.* Although prospecting may have to wait until the end of winter snows, there have been some indications of fair grade uranium outcropping in the area. It is reported that the United States Atomic Energy Commission has withdrawn lands to the north and south of the prospect area.

Lewis Stilson is operating on his uranium claims in the Yellow Circle district near Moab, Utah. The Fault claims have reportedly produced about $30,000 worth of ore with values up to 20 percent uranium oxide. Besides these four claims, San Juan Uranium owns 136 claims and holds another 150 under lease and bond. The company is a subsidiary of *Pyrenese Uranium Exploration Company, Inc.*, of which Elmer Taylor is president.

San Juan Uranium Exploration Company has purchased a diamond core drilling rig and is starting development at its *Fault* claims in the Yellow Circle district near Moab, Utah. The Fault claims have reportedly produced about $30,000 worth of ore with values up to 20 percent uranium oxide. Besides these four claims, San Juan Uranium owns 136 claims and holds another 150 under lease and bond. The company is a subsidiary of *Pyrenese Uranium Exploration Company, Inc.*, of which Elmer Taylor is president.

As the December 10 deadline for filing amended notices of location for uranium claims in conflict with oil and gas leases approached, and as there were increased numbers of uranium claims filed, the Grand County, Utah recorder reported

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that five years ago the total fees for recording for the year were slightly over $900 but that for only the month of November 1953 recording fees totaled just under $1,400.

The *La Sal Mining Company* has found uranium on its *Patsy* claim in the Big Indian mining district of San Juan County, Utah, according to T. C. Hudson, partner. The company is continuing surface drilling using a Mayhew 1000 drill which can use either air or water for bit cooling and cutting removal to the surface. The company is moving its mine camp to the Patsy claim and plans to sink a shaft and start mining as quickly as possible.

The *Big Seven Company* reports reaching uranium-vanadium ore indicated by United States Atomic Energy Commission's drilling on the leased *Yellow Cat* claims. The partners, who lease from *Utah Alloys Ore, Inc.*, are Ivan Johnson of Moab, Wayne Johnson and Vion Johnson of Price, Utah, and the Cato Brothers of Thompson, Utah. It is reported that ore shipments will begin shortly to the *Climax Uranium Company's* mill at Grand Junction, Colorado.

Bids for furnishing all specified labor, materials, and services for performing 40,000 feet of drilling for the United States Atomic Energy Commission in San Juan and Grand Counties, Utah were opened on December 21.

Vanadium Corporation of America has recently completed a three-compartment vertical shaft at its Marysvale, Utah operations. The bottom level of the shaft connects with a 2,000-foot crosscut which will be used for a main haulage way at the 750 foot depth. Company officials report plans to continue development of the property. VCA is operating a pilot plant mill at Hite, Utah and hopes eventually to construct a $3,000,000 uranium mill there.

Activities in the Gold Hill district of Utah are underway at several mining companies' tungsten properties. *Gold Hill Exploration Company* is operating a gravity mill with 25-ton-per-shift capacity of concentrate ores from its property. *Stardust Mines, Inc.* is handling approximately 15 tons of high-grade ore daily at its new gravity mill from the *Stardust* and *Timco* mines and does additional custom milling. Concentrates from this mill, which assay 55 percent WO_3 or more are sold directly to the government, while middlings are processed and refined to government specifications. With increased availability of ore, Stardust plans to expand to a two- or three-shift operation. *Timco, Inc.*, has received a $2,250 Defense Materials Exploration Administration loan for a bulldozing project and it hopes to expose surface veins resulting in an open-pit operation. *Tungsten Mines, Inc.*, is operating the *H. Burdick Lease* on Stardust property and has other holdings scheduled for future development. The firm has a $24,000 DMEA loan for exploration and development.

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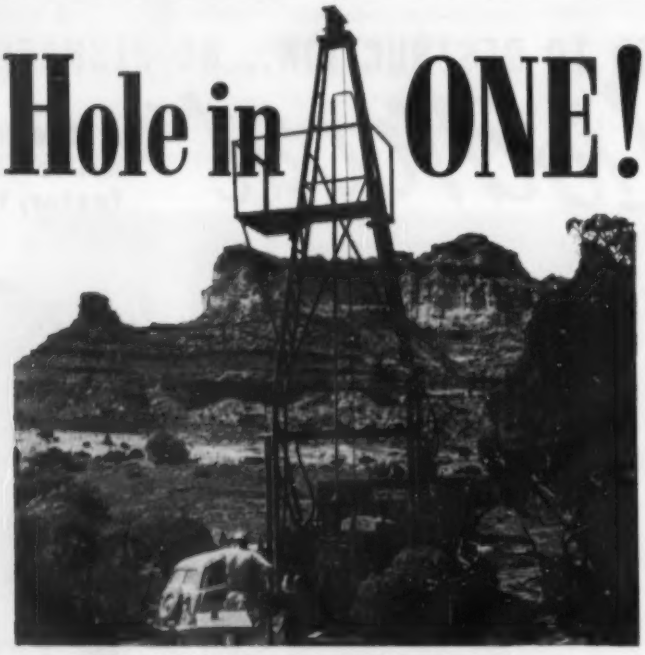

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WYOMING

The *Ruby Company*, associated with the *J. R. Simplot Company* of Boise, Idaho is making extensive tests to determine the extent and value of iron ore deposits 18 miles south of Lander, Wyoming in the Beaver Creek area of Fremont County. Testing operations are covering a claim area a mile wide. The deposits extend in a westerly direction three miles from the South Pass Highway toward Granier Meadow. According to Porter Ward, public relations director for Simplot, the ore is comparatively low in grade.

The *American Uranium Company* of Douglas, Wyoming reportedly has secured over 50,000 acres of mineral leases in Wyoming's Wind River Basin area. A geological crew is mapping the area. American Uranium has leases in Campbell and Converse counties where it has been carrying out an active exploration and development program.

Uranium activities in Fremont County, Wyoming seem to be boosting uranium hunting in other parts of the state with the latest interest reported in Carbon County. No definite shipments have been announced as yet but more than 100 claims have been filed for lodes located mostly in the southern part of the county. Most claims are made in the Baggs area where more than 300 uranium claims have been filed by residents. LeRoy Benson of Baggs staked claims in the area after he decided that a low circling plane was engaged in exploration Mr. Benson states that he has been offered $10,000 for his holdings. He further reports that outcrops run about $15 per ton. Geiger counters reportedly have confirmed these findings. Others have been filed in the Sage Creek Basin, the Miller Hill area, and near Saratoga.

Miami Copper Plans First Copper Cities Ore In Fall

Mining and milling operations at the Castle Dome Copper Company, Miami, Arizona, ended on December 5, 1953, at which time the ore body was mined out. The following day employes began the huge task of dismantling the entire Castle Dome plant and moving it to the property of the Copper Cities Mining Company. Both the Castle Dome and Copper Cities are wholly owned subsidiaries of Miami Copper Company, and the two ore bodies are comparable in size and grade.

The Castle Dome open-pit was a World War II venture, developed and equipped by means of a $13,800,000 RFC loan. It entered the producing class in June of 1943. Estimated production for 1953 is 20,000 tons of copper from ore containing less than 1 percent.

The Copper Cities property, sometimes called the Sleeping Beauty, is located three miles north of the International Smelter at Miami. It also is an open-pit operation for which an RFC loan was negotiated. In addition, the government agreed to buy at 23 cents a pound up to 170,000,000 pounds of the first 192,000,000 pounds produced. Preliminary work has been timed to use, as far as possible, personnel and equipment released from the Castle Dome operation. During 1953 close to 5,000,000 tons of waste stripped from the ore body, and excavation made and foundations laid in preparation for the milling plant. It is hoped to bring the property into production during the third quarter of 1954 and to attain full production at the rate of 10,000 tons daily in 1955. Copper content of the ore body is estimated at 0.7 percent.

Kennecott Starts Waste Removal at Veteran Pit

Stripping operations are now in progress at Nevada Mines Division, Kennecott Copper Corporation's new Veteran Pit in White Pine County, Nevada. About 60,000,000 tons of waste will have to be removed in order to mine the 20,000,000 tons ore assaying less than one percent copper. Pit production is estimated at 5,000 tons of ore per day for a period of 10 to 12 years.

The initial contract for removal of 4,000,000 tons of waste and overburden has been awarded to Isbell Construction Co. of Reno, Nevada. Weather permitting, this first phase of the pit development will be completed this month.

The United States Atomic Energy Commission at Grand Junction, Colorado, recently called for bids for performing 30,000 feet of non-core, rotary drilling within the Holbrook area of Navajo and Apache counties, Arizona.

Rico Argentine Mining Company of Salt Lake City, Utah reports that it purchased $300,000 worth of stock in *Banner Mining Company* last June. The money will be used to help finance operations near Tucson, Arizona, where the company is developing a copper mine and building a mill. Banner also owns a copper mine and mill at Lordsburg, New Mexico.

Among the additional DMEA contracts negotiated in Arizona during the last few months are the following: Jack L. Neal and Dennis E. Green, to explore the *Mystery Mines Nos. 1 through 6* in Gila County for asbestos, government participation—$24,241.50; W. A. Scott, Harry R. Scott, and R. D. Vinck, two unpatented lode claims in Gila County for asbestos, government's share—$12,722.40; Richard E. Chilson, two patented lode claims and one unpatented lode claim in Pima County for copper, government's share—$13,575; A. R. Floreen, George B. Dryden, and L. N. Duryea, two unpatented lode claims in Yuma county for tungsten $14,715; *Jaquays Mining Corporation, Regal* mine in Gila County for asbestos, $23,400; Gordon R. French, *Crown Point, Silver Cloud,* and *Wedge* patented claims in Pinal County for lead, $9,750; and *Bore Tree Saddle Asbestos Company,* two unpatented claims in Gila County for asbestos, $9,724.50.

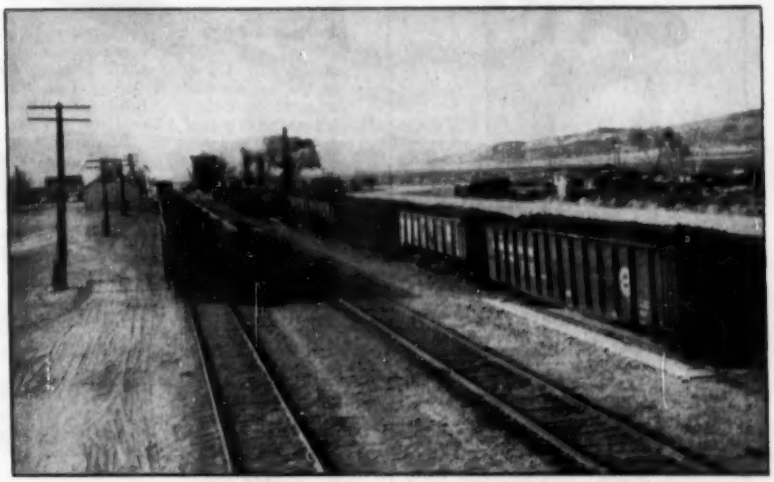
Siskon Corporation of Reno, Nevada, has closed its new cyanide mill at Happy Camp, California, for the winter months. H. B. Chessher, president of the firm, reports that during the first 45 days of operation (September 22 to November 6, 1953) mill head samples averaged about $23.00 per ton in gold and silver, and unwashed filtered tailings averaged $2.38 per ton. This represents, says Mr. Chessher, an average mill recovery of about 90 percent of the gold and silver values in the ore milled during that period.

About 30 tons of chrome ore are being mined per day by the *Helmke-Thomas-Jansen Company* of San Francisco at the firm's operation near Magalia, California. The ore is trucked to Castella, where it is milled and shipped to the government buying depot at Grants Pass, Oregon. Claude Wolgamott is superintendent of the operation.

The *Emma* mine near Magalia, California on Big Butte Creek is reported to have struck the old Emma Channel which was lost a number of years ago. Until that time, the Emma had been an outstanding producer of placer gold. Harry Gaylord is the owner of the property.

Idaho-Maryland Mines Corporation is reported to have uncovered gold-bearing quartz on the 1,450-foot level of its *Brunswick* mine at Grass Valley, California where diamond drilling last summer had indicated its existence.

Sunshine Mining Company has dropped a purchase option it took in May, 1953, on the *Mohawk* property in Esmeralda County, Nevada. Exploration work, which included opening a new 500 level nearly 300 feet deeper than previous workings, failed to indicate substantial amounts of ore. Avery Brundage, Chicago sportsman, was associated with



East Meets West At Wabuska, Nevada

Wabuska, Nevada, shown above, is becoming an important railroad shipping point on Nevada's mining map. The loaded railroad cars on the siding at the left are full of high-grade iron ore destined for Japan. The Continental Iron Mining Company of Los Angeles, California is shipping 275 tons of screened undersize daily from a 10,000-ton stockpile at the Standard Slag Company's open-pit mine 12 miles to the southwest. The railroad cars at the right are loaded with detinned, shredded, and burned tin cans from Southern California. Five cars per day are used for copper precipitation at the Yerington, Nevada leaching plant of the Anaconda Copper Mining Company.

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Sunshine in the venture. Robert M. Hardy, Jr., assistant to the general manager of Sunshine, was in charge of the Nevada operation. Brad Johnson of the Sunshine engineering staff was mine superintendent and engineer. Both have returned to the Coeur d'Alene, Idaho mining district, scene of Sunshine's main operations.

Anaconda Copper Mining Company has made its first carload shipment of copper precipitates from its new mine and leaching plant at Yerington, Nevada. The material left Wabuska, Nevada by rail, destined for the Anaconda reduction works at Anaconda, Montana. Regular shipments will continue to be made now but it will be some time before full capacity is reached.

Manganese Inc. has its processing plant at Henderson, Nevada back in operation after a fire destroyed most of the plant last summer. The kilns started to work on stockpiled ore in December and regular production is now under way.

Uranium Mines of America, Inc. is reported to have made an important strike at the *Linka* mine near Austin, Nevada. Diamond drilling cut across a 40-foot wide tungsten ore body at the 150-foot level. Drifting is now going on along the strike in both directions, and about 50 tons per day is being mined on one shift and stockpiled on the surface. Plans for the property include construction of a mill with a capacity of 150 to 200 tons per day. The property is held by Uranium Mines of America under lease and option to purchase. *California Tungsten Corporation* acquired the property from *C&C Tungsten Mining Corporation* last spring.

Magnet Cove Barium Company of Houston, Texas has taken a lease and option on barium properties in the Beowawe district near Elko, Nevada.

Taylor and Williams, a partnership formed by Alan I. Taylor and I. N. Williams, is operating the *A & B Mining Company's* open pit 30 miles north of Jungo, Nevada. About eight carloads of iron ore a day are being loaded and shipped to the *Youngstown Sheet & Tube Company* in Indiana. Taylor and Williams leased the last property last spring from Will Austin and Tom Beko.

Dodge Construction Company is reported to have received another contract to ship 60,000 tons of iron ore to Japan. The contract may also possibly be expanded to 160,000 tons before expiration. The ore comes from an open pit located south of Buena Vista Valley about 35 miles from Lovelock, Nevada.

The *Kattenhorn* silver mine had been leased by J. B. Cole, H. S. Dolezal, and Alvin Layton. The property is located at Maysville, 17 miles south of Battle Mountain, Nevada. A compressor and other equipment have already been moved to the site to begin operations.

Gabbs Exploration Company of Gabbs, Nevada is now mining scheelite from two levels of its new incline shaft and reported to be milling about 100 tons of ore daily. Lee Dougan is president and manager of the firm.

NEW MEXICO

Empire Zinc Division of *New Jersey Zinc Company* has completely suspended all mining and milling operations at its *Hanover* mine, because of the continued low price of zinc. Operations were curtailed more than a year ago, but production and development work continued in an effort to keep most of the miners employed. A few men will be retained to maintain and guard the plant, and Clarence Snell, acting superintendent, will remain in charge. Other department heads are being transferred to New Jersey Zinc's numerous operations in other parts of the country.

The *Tower Mining and Refining Company* has purchased a new $65,000 manganese ore processing plant for its property at Truth or Consequences, New Mexico. A flotation plant had been in operation for some time. Future plans for it have not been announced.

The contract for design, construction, and equipping of the new uranium processing plant at Shiprock, New Mexico has been awarded to *Western Machinery Company* of San Francisco. The $3,000,000 plant will be built for the *Navajo Uranium Division* of *Kerr-McGee Oil Industries, Inc.*, and will produce uranium oxide for the United States Atomic Energy Commission. A substantial quantity of vanadium is expected to be produced as a by-product. The installation is expected to be in operation by December 1954.

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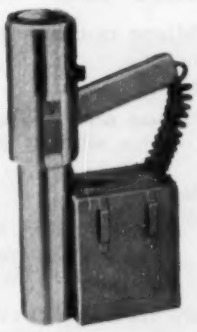

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Howe Sound Contracts With GSA For Copper Deliveries

Howe Sound Company will deliver 18,700,000 pounds of refined copper to the government through 1955 under terms of a contract with the U.S. General Services Administration. The agreement provides that the company produce ore from its Holden mine in Chelan County, Washington and arrange with a qualified smelter to process the ore. The government will pay 31.50 cents per pound, f.o.b. common carrier's conveyance, at any points within Washington, Oregon, California, or Nevada at government option.

Terms of the agreement call for production of 9,020,000 pounds on or before December 31 of this year and 9,680,000 pounds during 1955.

In June of 1952 the government signed an agreement with Howe Sound for production of 8,834,000 pounds of electrolytically refined copper. That agreement ended when copper was removed from price controls on February 25, 1953. Since the termination date of that agreement, the company has been operating without a government contract but cannot continue to do so without an arrangement such as the one recently announced.

Washington Firm Ready To Mine Copper Properties

After two years of development work, the Chewelah Copper Company is ready to mine ores from its several properties on Eagle Mountain in Stevens County, Washington. Consideration is also being given to erection of a mill in the area to handle the output.

The company owns the United Copper mine, once Washington's leading copper producer, and holds leases on the Amazon group of Spokane Copper Mines, the Copper King group of Banner Mining Company, the Latil group, the Independence Keystone, and the Copper Queen properties.

Gordon LaVigne of Chewelah has been reelected president; E. P. Maher of Yakima is vice president, and Philip Skok of Chewelah is secretary-treasurer. The firm's corporate address has been changed from Yakima to Chewelah.

Deepest level in the Coeur d'Alene mining region is being opened by *Sunshine Mining Company* at its Big Creek property in Idaho. The main Sunshine vein has been cut at a depth of 3,850 feet—approximately 1,150 feet below sea level. A station has been cut in the No. 5 winze preparatory to developing an even deeper level—the 4,000. The company is investigating a tungsten project near Mountain City, Nevada. R. M. Hardy of Yakima is president.

At the adjacent *Sunshine Consolidated* property, development work has been virtually tripled. A 3100 level westerly drift along the south limb of the Yankee Girl vein had been in ore for more than 125 feet at last report. A 2700-level westerly drift is being pushed on a two-shift basis to get above 3100 level stopes. A raise is to be driven to the 2700 level. Exploration of the property at the 3400-foot horizon is scheduled to start soon from adjoining ground of *Metropolitan Mines Company*, where a heading is nearing the projected downward extension of the No. 87 Met stope in the Yankee Girl vein, near the Sun Con boundary. *Sunshine Mining Company* is doing the work from its deep workings under development contracts.

Another Coeur d'Alene silver belt operator, *Polaris Mining Company*, is stepping up development work in the New Purim area of Idaho. Stoping is under way on the 3,000-foot level and a 3200 level heading is being advanced to get under the ore zone. A 3000-level exploration drift into ground of *Chester Mining Company* is approaching a section of the Chester vein which yielded some ore near the surface. Polaris' East Exploration project at the 3000 horizon had been driven more than 500 feet at last report and was still in the property of *Merger Mines Corporation*. The projects are being carried out from workings of the *Silver Summit* mine.

Day Mines, Inc. is crosscutting on the new 1600-foot level of its *Hercules* mine at Burke, Idaho to open the West Hercules ore body at greater depth. Car sidings are being cut every 200 feet. They will serve as stations for diamond drilling which will determine whether the main Hercules ore body bottomed on the 1200 level as indicated by work there many years ago. About 2,000 feet of tunneling is expected to reach the west ore body. Work is on a three-shift basis and miners are expected to average about 450 feet monthly. The company is maintaining full production at its *Dayrock* property but has suspended mining at its *Sherman* and *Tamarack* lead-zinc mines. More leasing is being done at the two properties, however. Henry L. Day is president and general manager.

Lucky Friday Silver-Lead Mines has drifted more than 175 feet in two headings—one east and one west—since intersecting the Lucky Friday vein on the new 2,300-foot level of its mine east of Mullan, Idaho, in the Coeur d'Alene district. Dave Elder is mine superintendent.

A change in metallurgical procedures has enabled *Sunshine Mining Company*, the nation's largest silver producer, to obtain a better return from its silver concentrate and to produce a new product, granular cathode antimony, at a rate of about 90,000 pounds monthly. The benefits were obtained by reactivating antimony-leaching facilities built in World War II but closed in 1944, and by revising the mill flotation circuit. The mill, on Big Creek in the Coeur d'Alenes, Idaho, is turning out a high-grade silver-copper concentrate averaging about 1,750 ounces of silver and 2.5 percent copper to the ton; also a lead-silver-iron concentrate. R. D. Leisk is general manager.

Oom Paul Consolidated Mining Company, inactive for more than 25 years, has elected a new board of directors and is considering reopening for examination purposes its main adit northeast of Burke, Idaho in the Coeur d'Alenes. Charles A. Tilford of Wallace is the new president.

Western Consolidated Mines, Inc. has intersected a five-foot vein carrying substantial values in gold and silver at the old *Ophir* property in the Bear Creek district near Rocky Bar in Elmore County, Idaho. The showing now is being developed. Gene Jack of Boise is president and general manager.

Production at the *Jack Waite* mine at Duthie, northeast of Mullan, Idaho on the Idaho-Montana border, is about 740 to 850 tons of lead-silver-zinc ore

$300,000 Tungsten Mill In Operation

A view of the new 300-ton gravity, and flotation mill near Glenn, Montana, is shown above. Owned by the Minerals Engineering Company of Grand Junction, Colorado, the mill is treating ore from Minerals Engineering's Lost Creek mine on Sugarloaf Mountain in Beaverhead County, Montana. It is also milling ore from a mine on the other side of the mountain operated by Minerals Engineering for American Alloy Metals, Inc. Exploration and development of the properties began in 1951, and construction of the mill started in July 1953. Mining is by open-pit methods. Mill concentrate averaging 10 percent WO_3 is shipped to The Salt Lake Tungsten Company refinery at Salt Lake City where it is retreated to produce a high-grade concentrate. Salt Lake Tungsten is jointly owned by Minerals Engineering and Sylvania Electric Products Company of Towanda, Pennsylvania. R. G. Sullivan, vice president of Minerals Engineering, is in charge of the combined Glenn, Montana operations. American Alloy is owned by E. A. Julian of San Francisco and Frank Eichelberger of Spokane, Washington.

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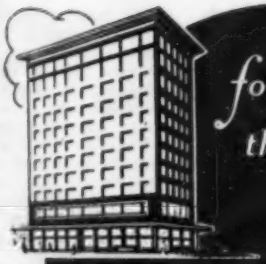

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monthly. *American Smelting and Refining Company* is the operating company. E. C. Gaumnitz of Seattle is secretary of *Jack Waite Mining Company*.

MONTANA

Lamon and Allen of Stark, Montana have constructed a small cyanide mill to recover gold values from ore uncovered in bulldozer cuts on the old *Nine-Mile* mine, approximately 15 miles northwest of Stark. The gold is free milling, but the presence of barite makes gravity concentration methods inefficient.

Production from the new plant of *American Chrome Company* near Nye, Montana is reported to have reached 660 tons per day or about two-thirds of its rated capacity of 1,000 tons per day. Full operation should be attained soon. The company recently granted wage increases of 8½ cents an hour to its 400 employes at the *Mouat* chrome mine which supplies ore for the plant.

Montana Standard Mining Company has installed an air compressor at its property on Prospect Creek in Sanders County, Montana, and hopes to start production soon. Loy L. Vose, company president, is in charge of the work.

Recent new mine incorporations in Montana: *Castle Rock, Inc.* with a capitalization of $50,000, by H. R. Stucky, M. M. Kelso, and D. C. Myrick, all of Bozeman; *Nonmetallics, Inc.* for $50,000, by L. H. Larison, William H. Porter and S. W. Stockdale of Helena, and E. B. Fralick, George W. Richardson and Charles W. Scott, of Butte; *Silver-Crescent, Inc.* for $90,000, by William A. Hall of Helena, and Henry G. Edwards and Joseph T. Wilson of White Sulphur Springs; *Elva Mining Company* for $250,000 by R. R. and E. C. Williams of Butte, H. C. Russell of Seattle, R. J. Anderson and S. P. Sorenson of Helena. Nonmetallics initially plans development, mining, and processing of talc in Madison County, Montana.

Frank Leahy is shipping oxidized lead ores from the old *Alta* mine near Corbin, Montana. The ore is mined by open-pit methods and comes out with a high moisture content. The ore is dried by an oil-fired kiln devised by Mr. Leahy, who reports that this does a very effective job with low fuel oil consumption.

The old *Dunsten* and *Klondike* claims near Elkhorn, Montana have been acquired by a Mr. Carver of Boulder, Montana. He is presently engaged in cleaning out the old shaft, drifts, and crosscuts in preparation for mining of silver and lead ores.

The present operators, Newberg, Newberg, and Sloan, are drifting in the footwall of a wide ore zone in the old *Eva Mae* mine, about 7 miles west of Basin, Montana. They are prospecting the ore zone by driving crosscuts at regular intervals and also by diamond drill holes.

OREGON

More than 400 men are employed in development and construction work at *Hanna Nickel Smelting Company's* Nickel Mountain project near Riddle, Oregon. Construction of facilities for extracting about 54 tons of ferronickel per day from 1,700 tons of dry ore are well advanced. These include four big primary furnaces, five electric furnaces for production of ferronickel and ferrosilicon, crusher and sampling plant, dry ore bins, and machine shop. Stripping for open-pit mining is under way. Production is scheduled to start next summer. *Hanna Coal and Ore Company* is developing the nickel deposit at an estimated cost of $4,300,000. The DMPA is advancing Hanna Nickel Smelting about $24,800,000 for construction of smelting facilities. Both firms are subsidiaries of M. A. Hanna Company of Cleveland, Ohio. E. S. Mollard is general manager of the project.

Canadian Johns-Manville Company is reported to have optioned some claims on Josephine Creek in Josephine County, Oregon, owned by George C. Foster of Kerby. Diamond drill test holes are being made. The claims were originally part of the old *Bear* or *Dixie* placer mine. Mr. Foster discovered asbestos in a 147-foot tunnel on one claim which had been driven to mine gold. Chrysotile asbestos veins were first noticed about 70 feet from the portal; a 6-foot-wide zone containing asbestos veins is now exposed in the face of the tunnel:

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U. S. Mining Men

(*Continued from page* 59)

pany's northwest mining department at Wallace, Idaho has retired. W. J. Murphy succeeds Mr. Hoover.

Charlie Hooper, formerly a geologist with the Alameda research laboratory of the Magnet Cove Barium Corporation, is currently inspecting mineral deposits outside the United States.

Mrs. Vera R. Ghinsberg, San Francisco manager of F. W. Berk & Company's Coast Chemical Division, has retired after over 20 years with the firm.

Clem Chase has been appointed chief metallurgist for the Utex Exploration Company, Inc. of Moab, Utah. Mr. Chase's special project will be uranium research. **Bob Fellmeth** has been named office manager for Utex.

Tom Lyon, until recently director of the Domestic Expansion Division of the Defense Materials Procurement Agency, has joined Southwestern Engineering Company of Los Angeles, California, in the capacity of consulting engineer.

J. P. Hall, president of the Western Mining Council and publisher-editor of the California Mining Journal, has been appointed a member of the California's State Mining Board by Governor Goodwin Knight. Mr. Hall succeeds **F. C. Van Deinse** of San Francisco, who has retired.

Carmine J. Venuto has joined Foote Mineral Company's research and development department as a mineralogist. He was associated with New Jersey Zinc Company at Franklin, New Jersey before coming to Foote.

Obituaries

David P. Hale, Jr., 40, metallurgical engineer for the Mine and Smelter Supply Company's Marcy Mill Division in Denver, Colorado, died on November 3, 1953 in Philadelphia. Mr. Hale had worked for many western mining companies in Colorado and Nevada, and had been mine manager of the Cartersville Barium Corporation in Georgia before entering the Armed Services in 1940. He had been with Mine and Smelter since 1946.

Charles A. Vignos, 86, president of the American Mine Door Company, died in Canton, Ohio recently. Associated with the firm since 1917, Mr. Vignos had added many new safety items to the company's list of products, including such accident-eliminating items as the electric switch throw and many types of rock dusters. Under his direction, the company developed a track cleaner and a car transfer which have been sold and used all over the world.

Robert John Bonnemort, noted mining engineer, died recently at his home in Kaysville, Utah. Mr. Bonnemort was with the Benguet Mining Company in the Philippine Islands before World War II. Following internment in a prison camp during the war, Mr. Bonnemort and his family returned to the United States.

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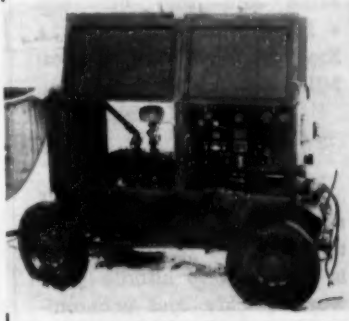

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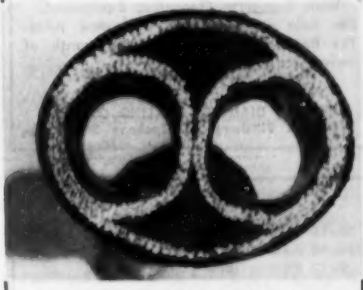

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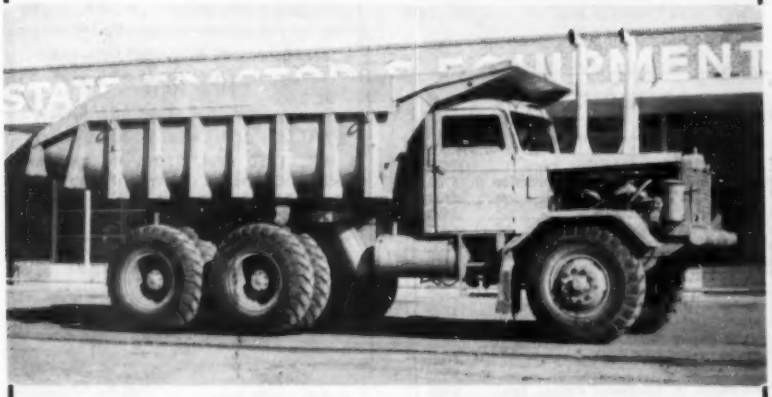

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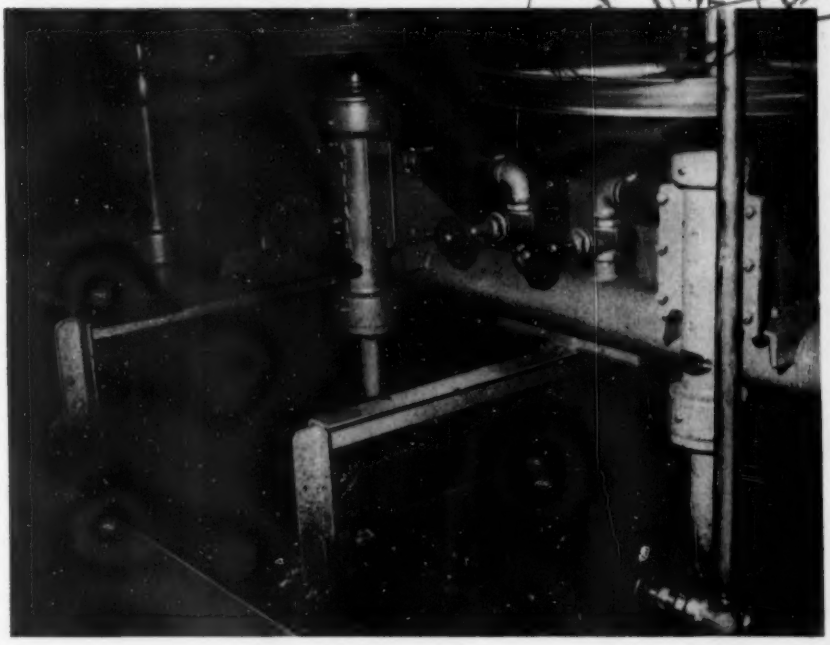

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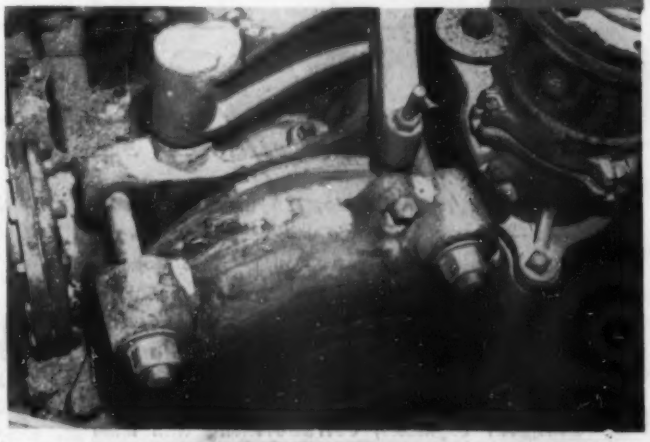

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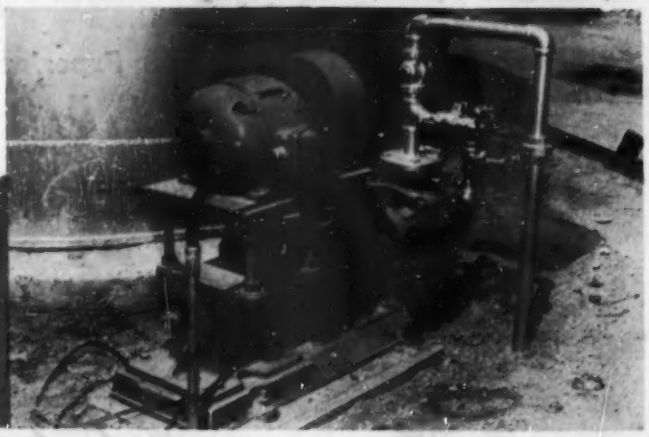

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